

# The Mining Journal

London, June 16, 1961

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## Brightening Prospects for Nuclear Power

**A**LTHOUGH the tempo of nuclear power development in the light of earlier and, as it turned out, over-optimistic predictions, has proved disappointingly slow, the outlook for the new industry is gradually but perceptibly becoming brighter.

So far as the installation of new generating capacity is concerned, there have been no spectacular developments in recent months. What matters, however, is the steady progress which technologists are making in mastering the problems associated with the economic generation of nuclear power. Sizewell, the largest station for which contracts have so far been placed by the U.K. Atomic Energy Authority, is expected to have capital costs of under £100 per kW., as compared with about £160 for Berkeley and Bradwell. Electricity sent out from this station may cost 0.65d. to 0.7d. per kWh., compared with 0.86d. and 0.81d. respectively for Berkeley and Bradwell.

The downward trend in the capital cost per kWh. of capacity should be progressive with successive nuclear stations, while the competitive position of nuclear power generation should be further strengthened by the lower prices at which both natural and enriched uranium are becoming available. It is not expected that the magnox system in the U.K. will be able to produce electricity as cheaply as the most advanced thermal stations, but there is little doubt that advanced gas cooled reactors will be fully competitive with thermal power. An experimental reactor of this type under construction in Cumberland is scheduled to come into operation by the autumn of this year. According to present estimates, electricity generated at a full-scale commercial A.G.R. should cost about 0.5d. per kWh.

The Central Electricity Generating Board's nuclear generation programme is summarized on page 685.

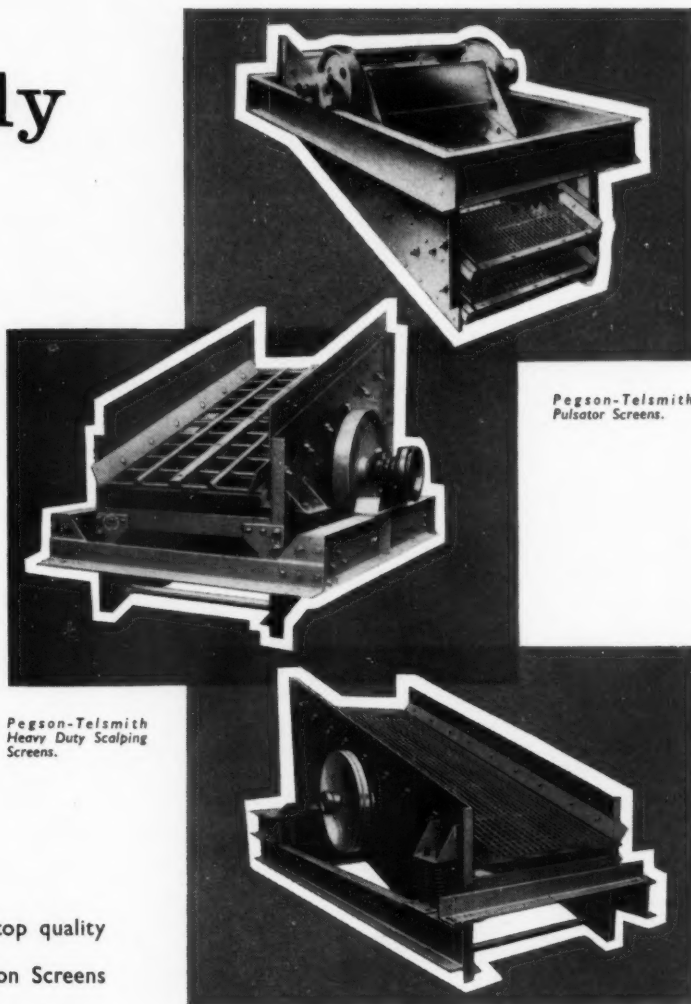
In the U.S. water and hydrocarbon-moderated reactors are likely to achieve overall cost parity at much the same time as the British designs, that is to say about 1969-70 (see *The Mining Journal Annual Review*, 1961, p. 53), and the same is true of Europe and some other areas. A marked acceleration in the construction of nuclear stations is therefore anticipated in the late 1960's, when a demand for uranium to fuel this programme can be expected.

Prospects for the nuclear industry have been further improved by the substantial price cuts for enriched and depleted uranium announced by the Atomic Energy Commission, which will take effect from July 1. Prices of enriched uranium are to be brought down by 20-34 per cent, while depleted uranium will be between 41 and 63 per cent cheaper. These reductions are expected to give a further impetus to the U.S. domestic nuclear power programme, though few government experts expect them to produce any large benefits immediately. They will also, of course, lower the cost of nuclear power for foreign-operated reactors using the American nuclear fuel.

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Enriched uranium is produced from natural uranium by increasing the percentage of the readily fissionable isotope U-235, which normally occurs in a concentration of only 0.7 per cent. The A.E.C. enriches natural uranium by diffusing uranium gas through a succession of porous barriers, the degrees of enrichment ranging up to 95 per cent. The new price schedule ranges from \$4.99 per kg. of uranium enriched to 1 per cent, to \$13.65 per kg. for uranium enriched to 90 per cent.

For the A.G.R. the degree of enrichment is 1.8 per cent if the cans are beryllium and 2.5 if they are stainless steel. The H.T.G.R. uses an enrichment of 90 per cent. Under the A.E.C. Act and regulations, enriched uranium is leased to licensed domestic operators of power, research and testing reactors. Discovery of a cheap commercial means of enriching uranium which eliminated dependence on the U.S. gaseous diffusion plants would bring very great benefits to the nuclear industry.

In the United Kingdom three large industrial concerns, Imperial Chemical Industries (Metals Division), Rolls-Royce and the Rio Tinto Co., recently formed a new company known as Nuclear Developments, to operate in the field of fuels for civil nuclear engineering in collaboration with the atomic power consortia. Nuclear Developments is the first private enterprise in Britain to undertake the manufacture of fuel elements and the preparation of fuel for civil purposes. Similar companies with which Rio Tinto is associated have been formed in Austria and Germany.

Particularly encouraging is the growing number of countries throughout the world which are becoming actively interested in the potential benefits of nuclear power in areas where other forms of primary energy are scarce. Brazil is about to sign an agreement with Euratom covering virtually all aspects of co-operation in the production and peaceful uses of nuclear energy, including the improvement of ore prospecting techniques and the processing of ores and source materials. This development is of particular interest as heralding Euratom's first appearance as a competitor of the U.S. Atomic Energy Commission, which has lately been making a joint survey with the Brazilian A.E.C. of the openings in Brazil for small power reactors in up-country centres where other fuel is lacking. Brazil, which already has two such reactors on order, has comparatively small resources of hydro-electric power or other primary energy, but she does possess large quantities of monazite-bearing sand, from which thorium is already being extracted on a pilot scale.

Dr. Usmani, chairman of the Pakistan Atomic Energy Commission, recently announced that Islamabad was to have a \$8,000,000 institute of nuclear science and engineering which, it was claimed, would be the most up-to-date research centre in Asia. Under a bilateral agreement with the U.S., Pakistan will receive enriched uranium fuel for the 5 mW. research reactor which it is proposed to erect. When it is considered that coal is three times as costly as in the United States and electricity costs as much as 10 c. a unit (approximately 9d.), nuclear power has promising prospects, despite the higher generating costs of the relatively small reactors likely to be installed in a country such as Pakistan.

India was among the first Asian countries to appreciate the potentialities of nuclear power. A reactor designed, engineered and built entirely by Indians, except for the fuel elements, was formally opened at Trombay in January, 1957, and a start on nuclear power production is envisaged during the Third Year Plan 1961-66. The uranium mine at Jaduguda in Bihar is to be expanded and it is proposed to set up a processing plant of 1,000 t.p.d. India's current reserves of uranium have been estimated at

over 30,000 tons and those of thorium at about 500,000 tons. A nuclear energy programme based on indigenous materials has obvious attractions on nationalistic grounds, but it appears to be more than doubtful whether the Jaduguda venture could be justified on economic grounds.

Indeed, the low price of newly mined uranium which, on present indications, seems likely to be stabilized at around the current level of \$5 per lb.  $U_3O_8$  for the next few years, suggests that few new mines will be brought to production before the end of the decade, at any rate outside the United States.

In fact, the curtailment of military contract deliveries has already brought about the contraction of the uranium mining industry to a hard core of highly efficient producers, whose aggregate output is more nearly in line with anticipated needs.

As was to be expected, the extremely competitive conditions now prevailing have led to an intensification of nuclear research in the uranium producing countries. In South Africa a pilot plant for uranium refining has been commissioned at the government's metallurgical laboratories in Johannesburg and will be used basically as a research project. The nuclear fuels produced will eventually be tested in the South African Atomic Energy Board's reactor that is expected to be commissioned at Pelindaba towards the end of 1963. Work is to be started this year on a £500,000 nuclear research institute for the Universities of Stellenbosch and Cape Town.

Canadian natural uranium-heavy water nuclear reactors are expected to prove economically competitive both at home and abroad. Last month the Canadian Nuclear Association expressed the view that by 1980 investment in Canadian atomic power plants would total \$4,000,000,000. The installation of a \$200,000 vacuum melting furnace at Eldorado's Port Hope, Ontario, refinery, will give Canada a completely integrated facility to process uranium metal from ore to finished nuclear fuel rod assemblies.

Dr. A. E. Grauer, chairman and president of the British Columbia Electric Power Co. Ltd. told the British Electrical Power Convention at Eastbourne that Canada now had several large research reactors in operation. One of 20,000 kW. is being completed this year and another of 200,000 kW., known as CANDU, is planned for completion in 1964 or 1965. In all, Canadians are spending close to \$50,000,000 per year on various research and development projects of this type.

Towards the end of last year Canada's six surviving uranium producers decided to finance a five-year research programme to find and develop uses for uranium. One of the most encouraging developments in this connection is a process for the use of uranium as an alloy to strengthen steel, developed by Canada's Federal Department of Mines, for which a patent has just been granted. The Algoma Steel Corporation recently produced its first commercial-size "heat" of uranium steel. Though no quick results can be expected, this interesting project seems to offer promising long-term gains.

For uranium producers, faced as they are with the approaching completion of government contracts before the advent of new capacity on any significant scale, the prospect of a flourishing commercial market is still uncomfortably remote. It can be said, however, that there are an increasing number of straws in the wind and that the wind is now blowing in the right direction. Canadian producers have further cause for hopefulness in the till recently undisclosed contract between the U.K.A.E.A. and Eldorado for 12,000 s.tons of  $U_3O_8$ , which is currently being renegotiated in Ottawa. Assuming that the outcome of the negotiations is favourable, this could go far towards tidying the industry over the critical years.





**WHAT IS DR. VERWOERD'S POLICY?**

This note deals with what is essentially a political issue. It does so, not because this is a political journal, but because political events have so obtruded themselves upon the affairs of the South African gold industry as to cause falls of some 40 per cent over the last eighteen months in the market value of the portfolios of mining houses, even though the mines themselves are intrinsically sound and are performing an essential job in easing the state of illiquidity into which the finances of the Free World have drifted.

Since the inauguration of the Republic, we have already had three notable statements from leading figures of the South African mining industry, which pose the problems facing South Africa as unequivocally and forcefully as they have yet been presented. First we had Sir Charles Hambro's address to shareholders of the Union Corporation, next—and most notably—Mr. H. F. Oppenheimer's statement which has been circulated to Anglo American shareholders in advance of their meeting and finally this week we have had Mr. C. S. McLean speaking at the annual meeting of the General Mining and Finance Corporation. (Mr. Oppenheimer's statement appears on page 706, and that of Mr. McLean on page 708.)

It is not for the outside observer to seek to tell South Africa how she should proceed to the solution of her racial problem even though he may justifiably express concern so long as no serious attempt at any solution is apparently being made. Certainly, for him to object to a solution by partition rather than by integration would be quite unrealistic in a situation where any multi-racial solution, which could be applied at sufficient speed to be effective in the present climate of African aspiration, remains unacceptable to the overwhelming majority of white South Africans.

On the other hand, Sir Charles Hambro was not overstating the changing attitude among many thinking people in the Union when he implied that the thought behind Mr. Macmillan's crucial wind of change speech of fifteen months ago was finding an echo among an appreciable proportion of Europeans in South Africa who "are thinking deeply today not of the narrow issue of maintaining their supremacy as white people at all costs, but of preserving Western civilization for the benefit of all races".

Nevertheless, the problem confronting progressively minded people in the Union is how to reconcile what must be done to win the confidence of the African no less than of the rest of the Free World with what is electorally practical in the foreseeable future. Mr. Oppenheimer, writing with notable courage in the prevailing political situation in the Union, states the magnitude of this problem quite categorically in saying that, in spite of all her advantages, "South Africa has so far been quite unable to persuade the world that she is meeting the challenge of the changing circumstances in Africa in a realistic manner". Moreover, in his view the dislike of South Africa's policies abroad cannot, at least among responsible people, be attributed to any misunderstanding or to any failure on the part of the South African government, from the Prime Minister downwards, to state its case clearly.

"The truth" says Mr. Oppenheimer "is that the fundamental principle upon which South African policy is at present based is morally unacceptable to practically all the nations of the world, European as well as non-European". As he points out, no amount of social services for non-Europeans, of development in the native areas, of local

self-government or even full independence in African tribal areas will reconcile the world to a policy under which African, Indian and coloured people, no matter how high their individual capacity or character may be, are denied on grounds of race and colour alone the rights of citizenship in the country in which they live.

This really is the crux of the matter. If the South African government is concerned to reassure foreign opinion of the sincerity of its intentions, it is becoming increasingly a matter of urgency not only that it should clarify the ultimate political freedoms which it envisages for the Bantustans, but, of equal importance, that it should clarify the status which Africans working and living in white South African areas are to enjoy as citizens of adjacent black African territories. If they are to have no political rights within white South Africa, are they at least to have the normal reciprocal civil rights enjoyed by aliens in any civilized country or are the Bantustans expected to remain in perpetuity as politically second class and subject areas from which the African emerges to earn his living from the white man only at the cost of surrendering his personal rights and freedoms?

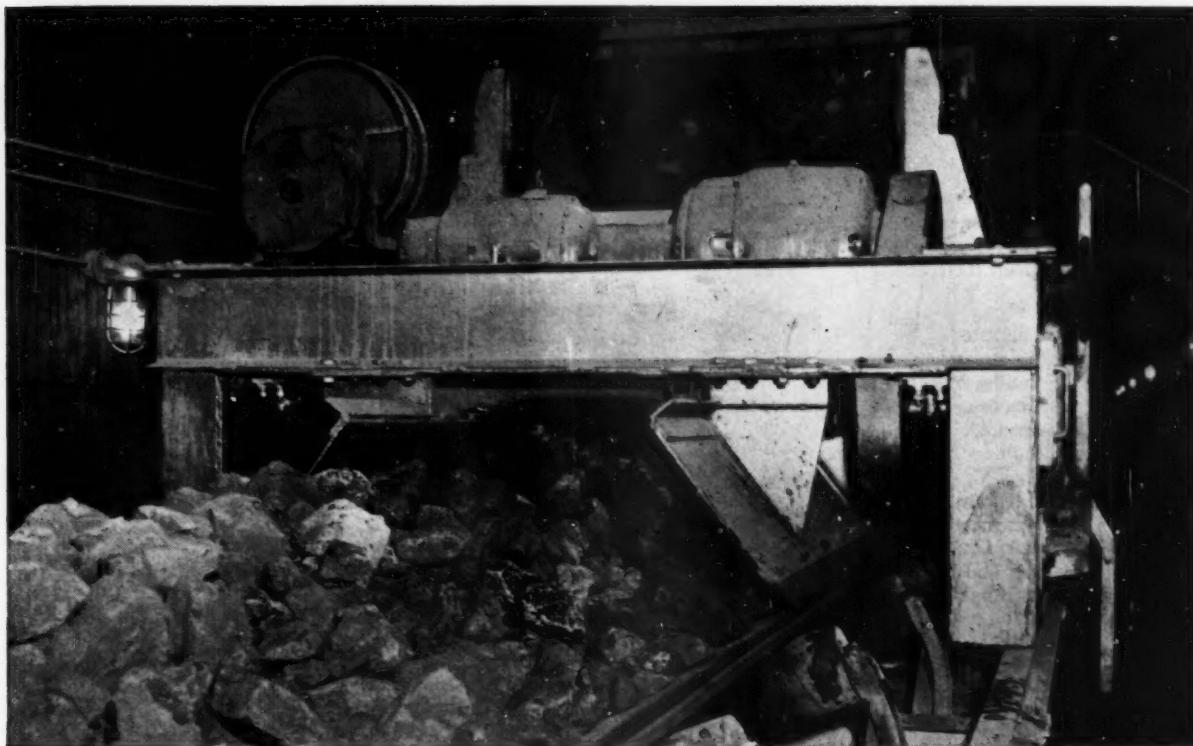
Aside from the Bantustan programme, the government has as yet, even in its utterances, done nothing to encourage the hope that it is facing up realistically to the problem of the urbanized Africans and other non-Europeans who, wherever they may be deemed nominally to be domiciled, are in fact living permanently in their millions in what are scheduled to remain white areas. Indeed, the fact that the wholesale preventive arrests in the fortnight prior to the inauguration of the Republic were apparently necessary to frustrate the three days stay-at-home strike offers scant encouragement to those, who, like Mr. McLean feel that at the very least the various non-European racial groups within the Union have the right to be consulted as to the government's plans for their future development and that the establishment of such consultative machinery would be warmly welcomed in South Africa no less than it would overseas.

However much South Africa may regard her racial problem as her own affair, the hard fact remains that in the strongly adverse climate of foreign opinion intensified by events since Sharpeville, the withdrawal of foreign capital from South Africa has been at such a rate as to cause a fall in the Union's gold reserves from a level of about £157,000,000 to the present figure of about £74,000,000.

In these circumstances it is scarcely surprising that Mr. Oppenheimer should warn his shareholders to expect a more conservative dividend policy in coming years, however, the intrinsic financial strength of the gold industry is such that if there is no further deterioration in market sentiment it can continue to finance its own operations even though it may have to tighten its belt.

This, however, cannot be said of South African industry as a whole. Still less can it be said of the large expenditures planned in the public sector of the economy—notably for the various public utilities and it must be presumed for the Bantustans.

It may well be that the drastic measures of import restriction, currency control and restriction of the supply of credit will be sufficient to arrest the Union's gold losses but measures which do no more than hold the line are quite inadequate to establishing an economic—let alone a political—climate which will attract the vast amount of new capital investment required in South Africa if the economic, social and eventually political advancement of the non-European is to be achieved.



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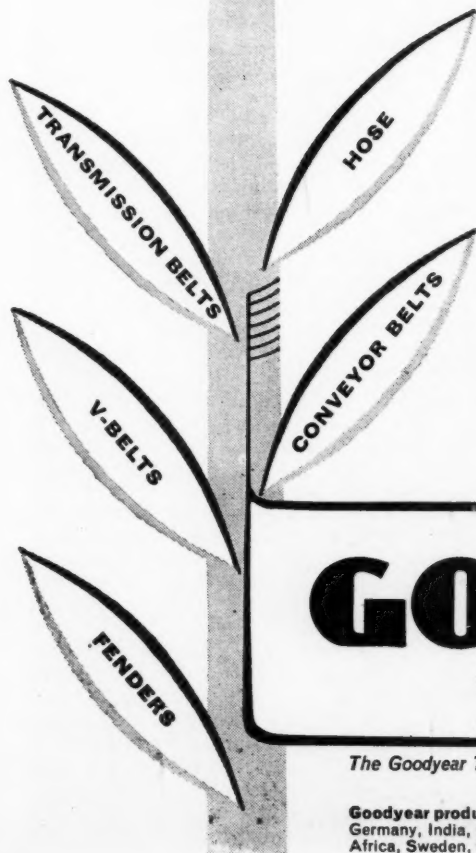
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## Mining in Indonesia's 8-Year Plan

**I**N Indonesia, following the return last year to the 1945 Constitution, there is now a system of "Guided Democracy" under President Sukarno, and an Eight-Year Development Plan was launched at the beginning of this year. This plan lists some 1,945 projects, and the estimated total cost is about £2,000,000,000.

The framework of organizations by means of which the government runs certain industries, including most mining, and controls the activities of those firms—industrial, agricultural, and commercial—which were taken over from the Dutch, is complicated and still fluid.

BUPPTAN, a sub-department of the Ministry of Basic Industry and Mining, is directly responsible for most mining activities, including the major existing and planned new coal mines, as well as tin and other minerals. BAPPIT is the organization set up to take over the former Dutch industrial firms, which include a few small coal mines in Kalimantan, while P.T. NEGARA was established to take over the former Dutch commercial trading firms.

It is intended that 25 per cent of the total cost of the Eight-Year Plan shall be obtained by means of loans and credit arrangements with foreign countries, the remainder being found from present earnings plus a portion (55 per cent) of the profits made by the first industries to be established. However, a good deal of cash business is also likely to be available as in the past.

First priority in the Eight-Year Plan is being given to food and clothing; improved power and communications are necessary for both. Coal mining will be an essential accompaniment, in order to conserve as much oil as possible for export, while metals and metalliferous ores and concentrates are themselves established earners of foreign exchange.

### Coal

The expansion of the Bukit Asam coal mine, at Tandjong Enim, about 100 miles inland from the port of Palembang in South Sumatra, is one of the most important projects. This is an opencast coal mine at present producing about 400,000 tonnes annually which it is proposed to expand to 1,400,000 tonnes. There are at present some German bucket-wheel excavators and conveyors as well as some American shovels and trucks on the overburden, but the German equipment is not popular. The coal is loaded by shovels on to belt conveyors and into trucks, and these latter conveyors, which are of British manufacture, have given satisfactory service.

There is therefore a good opening for British equipment if satisfactory credit terms can be arranged. A shopping list of items totalling £7,500,000 has been prepared by BUPPTAN. Coastal ships for transporting the coal, to a total estimated value of £9,000,000, are also required.

The Ombilin mine in West Central Sumatra is in production, but output is small and comes from underground workings, and it is understood that rehabilitation and expansion will involve opencast mining. The coal is said to be of better quality than that of Bukit Asam, and to be slightly coking.

It is proposed later to re-open an old mine on Pulo Laut, an island off South East Kalimantan, and to produce 500,000 tonnes annually. This will be an underground mine. There are also some small mines in Kalimantan formerly run by Dutch private companies, which have now been taken over by BAPPIT. One of these, with an annual output of 60,000 tons, is considering increasing this to 144,000

This report of the latest developments in the Indonesian mining industry is of particular interest in view of the visit last April of a United Kingdom Trade Delegation to South East Asia on which the British Mining Equipment Export Association was represented

by mechanization, including a conveyor on the surface for taking the coal to the wharf and loading it into ships. It is also reported that at a conference at the end of May it was decided to re-open coal mines along the Mahakan River in Kalimantan.

### Tin

The Banka and Billiton tin mines are in the market for two dredges capable of dredging 500/600 cu. m. per hr. from a depth of 50 m. There are three American dredges at present operating and also some old Dutch dredges which are in bad shape due to lack of spare parts. It is not clear whether the new dredges will be entirely for additional capacity or partly to replace the Dutch dredges.

The rehabilitation or replacement of the old tin smelter on Banka island is also on the list of projects for the Eight-Year Plan.

### Bauxite

Bauxite of very high quality has been worked on the island of Bintang for many years; production is now going to Japan and it is understood that Japanese equipment is being used. Output is now in excess of requirements but it is planned to expand it still further, and to set up an aluminium plant based on the Russian hydropower scheme at Asahan in N.E. Sumatra. No details of requirements are yet available.

### Nickel

There are a number of occurrences of nickel ore in Southern Sulawesi and some Japanese are operating, probably as contractors, as part of war reparations on one deposit which is said to have a nickel content of over 3 per cent. The scale of activities is small—5,000 tons of ore per month—and interest has been expressed in the idea of getting British help with these operations.

### Manganese

Manganese has been found in Southern Java since 1875. The deposit, as so far known, occurs in scattered pockets and has been worked sporadically by hand-mining opencast means. The government has now declared manganese to be an essential commodity, and has taken over the whole area with a view to mechanizing and thereby increasing production.

### Gold

A gold dredge at Logas, off the N.E. coast of Sumatra, is said to be in urgent need of reconditioning, so that the mine could once again produce. There appears to be a useful opening here for consultancy and cash is believed to be available for the purchase of equipment.

There is another working gold mine at Tjikotok, the main interest of which is the possibility of recovering lead from the tailings.



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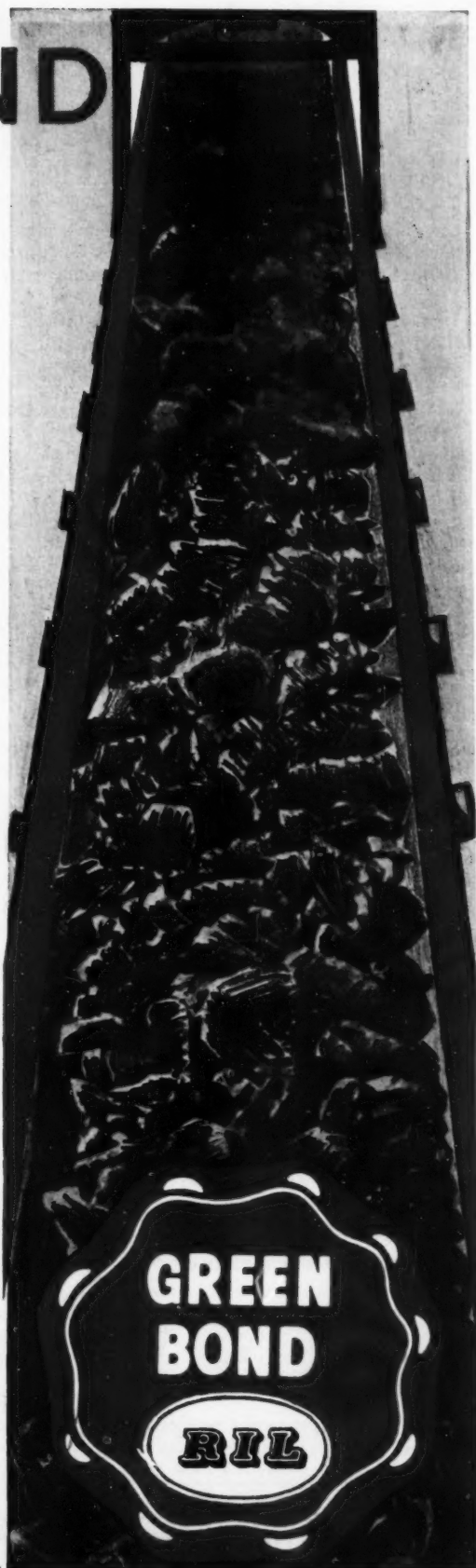
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## Generation of Electricity for Britain's Growing Needs

**T**HE winter peak demand for electricity in Great Britain has grown for many years at about 7 per cent per annum and this rate of growth is expected to continue over at least the next ten years. In the light of recent trends there would in fact be grounds for increasing this figure, but it is being accepted as a reasonably safe guide to future conditions and one which for most purposes can be used as a basis for future planning. It is interesting to note that the growth rate for electricity consumption in this country is almost identical with the growth rates in other countries. A growth rate of this order is equivalent to a doubling of the load every ten years, which indicates that the load to be expected in the winter of 1970-71 will be about twice the figure of nearly 25,000 MW which would have occurred during average cold spell conditions during the past winter.

In order to meet these loads sufficient new generating plant and transmission capacity must be provided to meet the anticipated increase and transfer the energy from the points of generation to the points of consumption.

The outputs of the generating stations in England and Wales are co-ordinated by a National Control Centre in London through seven Regional Control Centres at Newcastle, Leeds, Manchester, Birmingham, Bristol, Thames North and Thames South. There is also a tie-line to a Scottish control centre in Glasgow over which an interchange of energy is arranged between Scotland and England on a day-to-day basis.

### Energy Flows

The generation of the country's electricity requirements at the lowest overall cost calls for the extensive transmission of energy from the Midlands and the North, where coal is relatively cheap, to the South where fuel is dear. As the amount of generation on the coalfields has been increased so the amount of energy to be transmitted electrically over the country has increased and the British grid system has had to be expanded to meet these growing requirements. When large amounts of energy have to be transmitted by overhead lines, significant economies can be made by increasing the voltage at which the energy is transmitted. The original grid system was designed to work at 132 kV., the most recent developments have raised the voltage to 275 kV., and arrangements are in train for adopting a voltage of 400 kV. for further main transmission lines.

The 275 kV. circuit has over four times the carrying capacity of 132 kV. circuit and an increase to 400 kV. can more than double the capacity of the 275 kV line.

TABLE I  
UNIT SIZE, STEAM CONDITIONS AND CAPITAL COST

Unit size, MW (Installed)	Steam pressure, lb./sq. in., and temperature deg. F.	Year first com- mis- sioned	Thermal efficiency, per cent	Capital cost of complete station £ per kW sent out
30	600/ 850	1948	26	67
60	900/ 900	1950	29	57
100	1500/1050	1956	32	58
100*	1500/ 975/ 950	1957	33	59
120*	1500/1000/1000	1958	34	53
200*	2350/1050/1000	1959	36	50
275*	2300/1050/1050	1962	36	41
550*	2300/1050/1050	1963	36.5	39

\* Reheat

*This survey is abstracted from the thirteenth "W. M. Thornton Lecture", "Generation and Bulk Transmission of Electricity by the Central Electricity Generating Board", delivered by A. R. Cooper to the Annual Convention of the Association of Mining, Electrical and Mechanical Engineers at Harrogate on June 9, 1961*

For distances in excess of 50 or 60 miles it is cheaper to transmit electrical energy at high voltage than it is to convey fuel by rail and to generate at the load centre. The whole tendency in our forward planning is therefore to replace coal transport by electrical transmission. The requirements of the London Area are to be met to a very large extent by bulk electrical transmission from the Midlands. In addition to the movements of coal and electricity there will be some direct generation from imported oil and from nuclear power stations.

### Improvements in Efficiency

Over the years there has been continual improvement in the design of generating plant, chiefly by the adoption of higher steam pressures and temperatures and the use of the reheat cycle, and by an increase in the size of individual sets and boilers. It is interesting to note that, despite the inflationary growth which has occurred in the costs of labour and materials over the past twelve years, the capital cost per kilowatt of a modern generating station is less than the cost per kilowatt of a station built in 1948. See Table I.

Generating stations are being designed with capacities of the order of 2,000 MW (four 500 MW sets) and a station of this size will consume more than 15,000 tons per day.

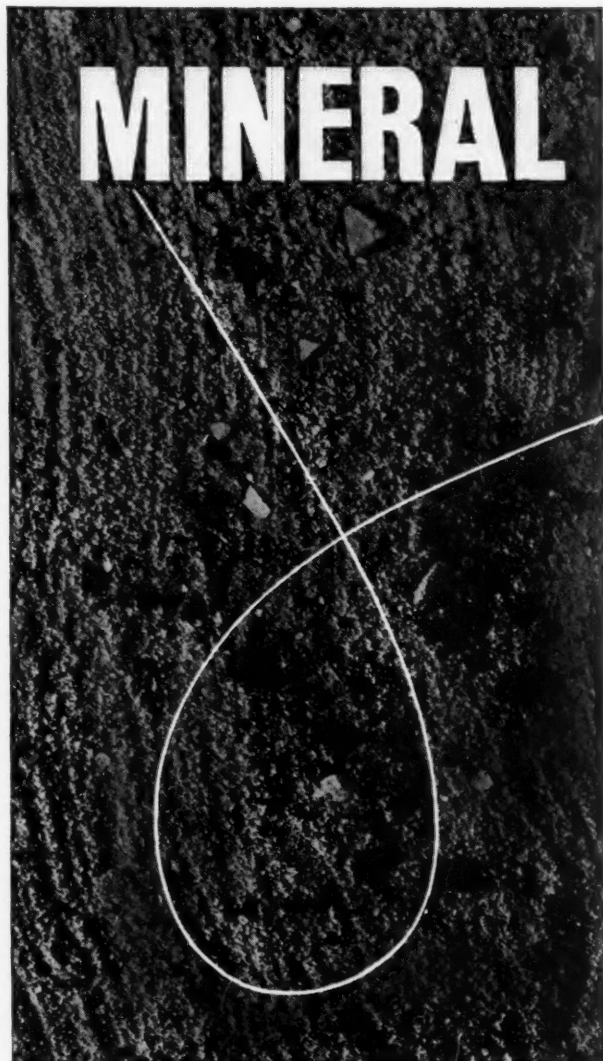
The adoption of these modern practices is producing a steady increase in the overall thermal efficiency of the Board's stations. The thermal efficiency for 1960 was 26.71 per cent, compared with 26.36 per cent for the previous year and 21 per cent in 1948.

### Impact of Nuclear Generation

Towards the end of 1961 and early in 1962 the Board's first nuclear power stations will be brought into service at Berkeley and Bradwell and they will form part of a programme of nuclear generation which is designed to provide 2,705 MW of generation, excluding contributions from the United Kingdom Atomic Energy Authority and South of Scotland Electricity Board, within the next six years as shown in Table II.

TABLE II  
NUCLEAR GENERATION PROGRAMME

Year of com- mis- sioning	Location	Output (MW s.o.)	Steam pressure and temperature
1961	Bradwell	300	H.P. 704 deg. F. 756 lb./sq. in. L.P. 704 199
1961	Berkeley	275	H.P. 612 deg. F. 306 lb./sq. in. L.P. 612 62
1962-63	Hinkley Point	500	H.P. 686 deg. F. 660 lb./sq. in. L.P. 660 176
1963-64	Trawsfynydd	500	H.P. 720 deg. F. 978 lb./sq. in. L.P. 696 313
1964-65	Dungeness	550	H.P. 739 deg. F. 1403 lb./sq. in. L.P. 742 575
1965-66	Sizewell	580	H.P. 737 deg. F. 682 lb./sq. in. L.P. 734 deg. F. 266
TOTAL		2,705	



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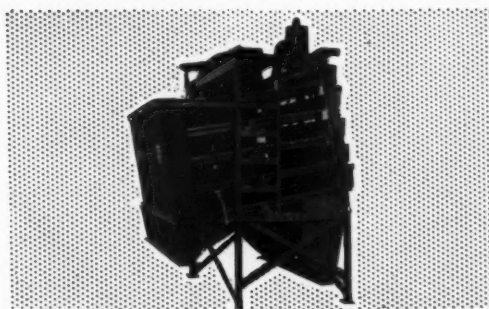
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The use of nuclear power stations will call for new and more advanced operating techniques in the stations themselves and in the arrangements which will have to be made for the combined operation of nuclear and coal-fired stations. It is inherent in the design of a nuclear station that it should be run as long as possible at full load since it is not suitable for the rapid changes in output which have to be accepted by coal-fired and oil-fired stations. In addition, although the capital costs of a nuclear station are much higher than those of a coal-fired station, its running costs are very much lower, as shown in Table III. The nuclear stations will therefore be run on base load so far as possible throughout their working life. Difficulties will tend to arise when there is insufficient base load to accommodate the output of all the nuclear power stations, for the normal night load on the system might well be less than the total nuclear generation.

The adoption of a pumped storage scheme at Ffestiniog in North Wales will help to alleviate this position and will, in addition, produce appreciable economies in the operation of the system.

Another development of some interest is the cross-channel cable link between Great Britain and France. This link will consist of two 30-mile cables running along the sea bottom from Dungeness in Kent to a point near Boulogne. The cables will carry direct current at a pressure of 200 kV with the centre point earthed and the circuit will have a carrying capacity of 160 MW.

In 1955 it was thought that the increasing demand for electricity would fast outstrip the ability of the National Coal Board to supply the industry's basic fuel requirements. Coal was in fact having to be imported during that year. It was realized that nuclear energy, the new source of power, could not be made available in time and in sufficient quantity to meet this deficit and it was decided by the government that what was regarded as a short-term gap should be met by the import of fuel oil. Arrangements were therefore made for fourteen stations to be changed over to oil burning and contracts were entered into for the import of oil to the extent of 8,000,000 tons per annum of coal equivalent.

The coal supply position has radically changed since that date and the existence of a coal surplus in this country has naturally led to a desire on the part of the coal producers for some reduction in the amount of oil used for electricity generation. The number of oil-burning stations has in fact been reduced from fourteen to twelve.

With the impact of nuclear generation on a large scale, as from the end of 1961, the Generating Board will be

TABLE III  
COMPARISON OF CAPITAL AND RUNNING COSTS FOR COAL AND NUCLEAR STATIONS

Station	Installed capacity (MW I.)	Capital costs £/kW s.o. (total construction)	Running costs d/unit s.o. (fuel replacement and other charges)
<i>Coal</i>			
High Marnham ...	1000	52	0.42
Thorpe March ...	1100	37	0.40
Skelton Grange B ...	480	52	0.39
Willington B ...	400	43	0.41
West Burton ...	2000	37	0.40
<i>Nuclear</i>			
Bradwell ...	373	165	0.27
Berkeley ...	334	165	0.34
Hinkley Point ...	660	133	0.28
Sizewell ...	648	101	0.23

manoeuvring in a three-fuel economy—coal, oil and nuclear—in which cost might not be the only consideration. During the three years up to and including 1965-66 the consumption of coal for conventional power stations will have risen from its present level of 43,000,000 tons per annum to some 55,000,000 tons, the contribution of nuclear stations should be of the order of 7,000,000 tons of coal equivalent, the balance being made up by imported oil.

The new generating plant to be commissioned during the five years 1960-65 inclusive will amount to 12,290 MW. Of this total 2,405 MW will be nuclear and 390 MW oil-fired.

The two major advances in coal-fired generating practice will be the supercritical sets at Drakelow C, operating at 3,500 lb./sq. in. and 1,100 deg. F. with 1,050 deg. F. re-heat, and the first 500 MW single spindle machines which will be installed at West Burton.

The first six atomic stations will be developments of the conventional graphite-moderated gas-cooled magnox type and although intensive development work is taking place with the Advanced Gas-Cooled Reactor (A.G.R.) the Board are unlikely to adopt this type of design until some years after 1965.

The research effort of the Generating Board is being greatly expanded and is expected to reach a figure of over £3,000,000 per annum by 1963. A separate nuclear research laboratory is being built adjacent to the Berkeley nuclear power station and this will be concerned, among other things, with work on graphite, canning materials, fuel cycling and nuclear safety.

## Freezing Techniques in Polish Mines

GROUND freezing to aid shaft sinking in Poland dates back to 1883, when it was employed at what is now the Michal colliery at Michalkowice. In 1891 a small shaft was sunk by this method at Tarnowskie Góry, and between 1904 and 1906 two shafts were sunk at the Brzeszcze colliery. Between the wars, one shaft was sunk at the Grodziec pit and one at the Marklowice. In salt mining, freezing was used in Poland for the first time in the Wapno mine between 1913 and 1915, and subsequently in the Solno workings at Inowroclaw in 1925-6. The technique has been described by M. Eng. K. Grzymalski in *Przegląd Techniczny*.

At present, ammonia units are used for ground-freezing operations, with an output of 70,000, 190,000 and 250,000 kcal/h at -20 deg. C.; two-stage ammonia units are also available, having a yield of 220,000 kcal/h at -40 deg. C.

The method is applied not only in the coal industry, but also in the mining of ferrous and non-ferrous ores, rock salt, and potassium salts.

With the increased availability of equipment and the accumulation of experience, the maximum rate of advance in shaft sinking has risen from 12.6 m/month in 1946 to 62.0 m/month in 1960. The total depth of shafts sunk has risen from 24 m/year in 1945 to 635 m/year in 1959. In 1947, 730 m. of frozen bore holes were sunk, in 1959, 12,150 m. Over the last decade the relation between the depth of shafts sunk by freezing and the total depth sunk by all methods averaged 13.7 per cent. The programme for the next few years envisages a further wide use of the freezing method, especially in the Rybnik coalfield, where seams of excellent coking coal are covered by 300 m. of loosely compacted rock, and in the mining of potassium salts and non-ferrous ores.



## Commonwealth Conference—III

## RECENT ADVANCES IN MINE SAMPLING AND UNDERGROUND

THE South African gold-bearing deposits are vast, non-homogeneous and often highly erratic in content and, because of the low average grade of ore and the attendant cost structure, successful mining operations are largely and increasingly dependent on close grade control and the careful assessment of the ore yet to be won or reclaimed. Many empirical "experience factors" were evolved with a view to reconciling sampling-assaying results with gold actually recovered or accounted for, and served their purpose until further adjustments were made in the interests of still more reliable estimates and forecasts.

The striving after greater accuracy and confidence in the increasingly important field of mine valuation is continually exercising the minds of the best mining engineers in the industry. New methods and aids have been developed, new ideas tested, and more accurate interpretations achieved through the application of modern statistical procedures.

## The Sample—its Weight and Width

In training a sampler, it is continuously emphasized that each relatively small quantity of ore or rock collected by him for assaying must be thoroughly representative of the bulk from which it was obtained. Except for special metallurgical tests, large bulk samples are seldom taken and the weight of a sample usually ranges from 1 lb. to just over 4 lb., averaging about 2 lb. A 2 lb. sample from development ends commonly constitutes only 1 part in 1,200 of the reef band it represents; and from stope faces, only 1 part in 11,500. Where a narrow reef is excavated at a stoping width of 36 in., the sample is of the order of 1 part in 100,000 mined<sup>1</sup>.

To test a widely held theory that more reliable results were obtained by taking larger samples, Rand Mines, Limited examined 1,785 duplicate check samples from pairs cut in the same groove. The experiment was carried out at Durban Deep, City Deep and Harmony and covered five different reef horizons, the channel widths of which ranged from a fraction of an inch to 50 in. Duplicate sample cuts were weighed and assayed for fine gold. The individual sample weights varied from  $\frac{1}{2}$  lb. to 7 lb.

Weights within pairs correlated highly, which meant that both cuts were of the same weight magnitude. Ratios of original to check dw./ton values were calculated for each pair, and standard deviations of the resulting log-ratios were computed for sample pairs whose average weights lay within narrow given weight ranges.

Contrary to expectation, the log-ratio standard deviation did not decrease with increasing sample weight. The conclusion was that, for a sample range of  $\frac{1}{2}$ -7 lb., the reproducibility of check samples taken in the same groove was independent of sample weight, and hence that the overall reliability of sampling did not materially increase by chipping larger samples.

One of the major reasons for this apparently anomalous result is to be found in the chance error incurred in splitting underground samples in the assay office after coarse crushing.

To test this theory, one half of several hundred underground samples were split conventionally and the other half after pulverizing.

The splitting error was much smaller after pulverizing than after coarse crushing. The variations, introduced by the conventional sample splitting in the assay office, were

found to be of the same order as the variations of values *in situ* in the same groove.

In consequence of these findings it does not pay at present to cut large underground samples. If the entire sample material delivered from underground were pulverized before fusion increments are weighed out the position would alter materially. Under such conditions larger sample cuts should result in increased reliability.

The sample is chiselled out of the orebody, the richer portions of the reef being sampled over widths frequently as narrow as 2 in., the less important scattered pebble or grit bands usually being sampled over maximum widths of 10 in. to 12 in. The chipping-out of a geometrically perfect sample from the local hard rocks is virtually impossible and, as a precautionary measure, the sampling of the rich portions of the reef over a narrow width has become standard practice throughout the industry.

This technique was first advocated by one of the authors (H.S.S.) in 1947<sup>2</sup>. The experimental investigation described in that paper established clearly that the more friable portions of the valuable material were over-represented if excessive waste was included in the sample cut, due to the latter breaking in the form of a wedge. In 1948 Muller<sup>3</sup> verified this phenomenon by comparing bore-hole core sampling with hand sampling.

The bias error in narrow reef sampling may be of the order of + 25 per cent. If samples are cut over reef width plus  $\frac{1}{2}$  in. waste contact on either side of the band this error becomes negligible or disappears altogether.

## Treatment of Original Sampling Values

Prior to the last decade, several empirical methods of "cutting" values considered to be anomalous were practised<sup>4</sup>. The ultimate object of the "cutting" of such values was to water down the samplers' call for gold to match more closely the gold actually accounted for in the reduction works and hence to achieve a 100 per cent Mine Call Factor. These practices tended to obscure other mining or sampling deficiencies.

All the newer mines are leased from the State and, in terms of the lease agreement, the grade of ore mined must be reasonably in accord with the average value of the ore reserve. Valuation practice is subject to review by the Inspector of Mining Leases and, although not specifically written into a lease agreement, the "cutting" of original sampling results is not permitted. As far as the writers have been able to ascertain, the "cutting" of original values has ceased also on the older, non-lease mines throughout the industry.

Where a value is thought to be abnormally high, it is check-sampled in duplicate. If the check-sample value is still high, the normal practice is to use the average of both original and check-sample values. The very high values occasionally encountered underground are nevertheless true occurrences, in perfect concord with the fundamental log-normal distributions of ore values *in situ*, as observed again and again by several authors<sup>1, 3, 6, 16, 18, 19</sup>.

## Sampling Equipment

Apart from minor modifications and improvements, such as the use of chisels tipped with tungsten-carbide inserts, there has been little change in sampling equipment.



# EVALUATION PRACTICE IN SOUTH AFRICAN GOLD FIELDS — I

Two mining groups are experimenting with the use of calipers to determine for record, to a tenth of an inch or so, the sampling width of narrow but rich bands of reef. It has, however, been observed that, although the lower contact of the mineralized band is usually sharply defined, the upper contact is frequently indistinct—especially after being chip-sampled—and, consequently, many of these alleged accurate measurements are debatable.

## Special Sampling Equipment

The original "St. Clair sampler", designed by W. St. Clair of Johannesburg, was tested at the Diamond Research Laboratory late in 1950, and reported on by Dauncey<sup>6</sup>. Fitted with two 5½ in. dia. diamond-impregnated cut-off discs, this portable and handy machine, weighing 20 lb., was found to be "simple to use, easy to maintain, and accurate in operation", but its effective cutting depth was little more than ½ in.

The machine was later modified, and the authors are indebted to the Anglo American Corporation of South Africa, Ltd., (the principal users initially of this "Mark II sampler") for information relating not only to this tool but to a somewhat similar "C sampler" developed by that Corporation. In both cases the power units are Holman Rotogrand air motors with maximum spindle speeds of 8,000-8,300 r.p.m. at an air pressure of 85 lb. p.s.i. The "Mark II" differs little from the original tool. During actual tests the outer wheel was permanently removed to permit of the cutting of varying sample widths. Initially a type of bar rig with gear controls was used but, as it was cumbersome and took too long to erect, was experimentally discarded. Two cutting wheels were badly bent before the operator became accustomed to holding the machine steady, but he has since taken over 200 samples without further serious damage to wheels.

The "Mark II" has a 6 in. dia. disc with an effective cutting depth of 1½ in., and is capable of cutting nearly 1 in. deep for 5 samples per hour. Wheels tested averaged just over 14 samples each at a wheel cost of 9s. per sample. The "C sampler" which weighs only 7½ lb. has an 8 in. dia. disc, with an effective cutting depth of 2 in. At a depth of approximately 1 in., it cuts for 4½ samples per hour, each wheel averaging 25 samples at a wheel cost of 8s. per sample. A light steady pressure is applied until the wheel penetrates to the normal depth of 1 in. It is then drawn downwards (or sideways) along each sample boundary line in turn, and each sample is subsequently chipped out to a uniform depth in the usual way.

The authors suggest for consideration that, if the face is smooth enough, it might be feasible to cut an equilateral-triangular "core" from the reef channel to eliminate altogether the need for manual chipping.

It was hoped that the tool would prove invaluable not only in the sampling of important reef intersections but as a standard against which the work of the senior samplers could be judged. The results very recently obtained are of considerable interest.

At the Vaal Reef and Western Reefs mines 100 sections on the Vaal Reef horizon were sampled in the following manner:

Four sample cuts over the narrow reef bands plus a small amount of waste contact were taken side by side at a particular section. Two samples were chiselled by the most

The article appearing herewith is condensed from a paper presented at The Seventh Commonwealth Mining and Metallurgical Congress convened in Southern Africa. It is one of a series in which papers of particular interest are offered in abridged form

experienced sampler on the mine, with plenty of time to do a good job, and two cuts were taken with diamond wheel machines. Statistical analysis of the resulting 400 parted assay values showed that the hand sampling reproducibility was almost as good as that of the machine sampling. A small statistically significant bias was found, the machine yielding values approximately 3 per cent higher on average than those obtained from hand sampling.

This experiment, carefully planned and meticulously carried out, showed conclusively what can be achieved by a skilful sampler if given enough time to do this work. Needless to say, routine conditions are far removed from the ideal ones which were obtained in this investigation. However, experiments such as those described above have great practical value in determining the "natural" variability of ore values in small areas *in situ*. They have proved invaluable for setting reasonable limits for sampling control charts.

## Check-Sampling and Control Charts

In the gold mines of South Africa, duplicate check-sampling—either in the same groove, or in immediately adjacent positions—has long been practised with the primary object of supplying management with reliable data for the control of mining operations and, conversely, to ensure as far as possible that the data supplied are neither faulty nor misleading. Unfortunately, due to the inherent or natural variability of the ore deposit, as well as to variations in methods of sampling and to the human factor, there are innumerable instances on record of wide discrepancies between check-sampling results. Until recently it was extremely difficult, and often impossible, to differentiate between normal and abnormal discrepancies: In recent years this problem has been minutely examined by the authors<sup>6</sup>, in collaboration with C. H. Coxon<sup>7</sup>, who have attempted to supply a scientifically acceptable yardstick by presenting methods of setting permissible standards of variability in both sampling and assaying.

Fig. 1 shows the plotting of 267 pairs of check-samples from a Witwatersrand mine. The fan-shaped spread of the plotted pairs of values is notably characteristic. The almost equal number of points above and below the line shows that there is little significant difference between the

By **H. S. Sichel**

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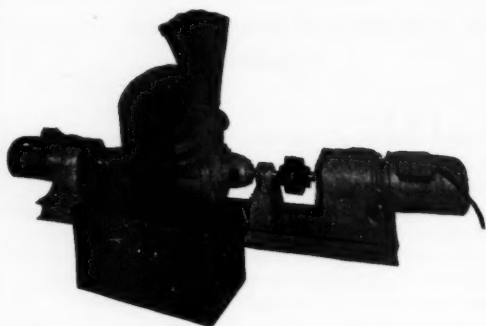
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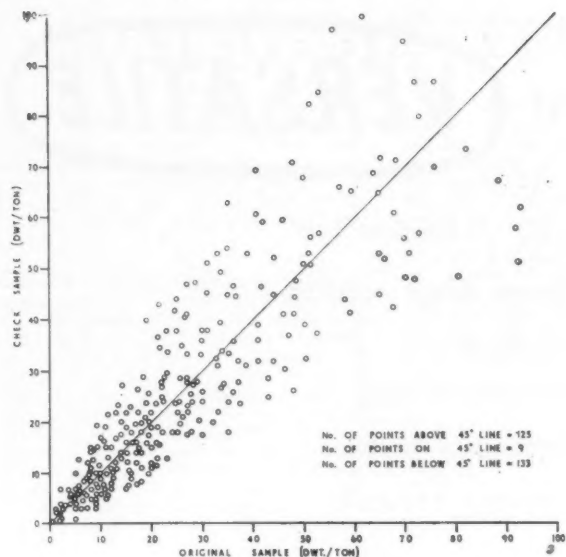


Fig. 1: Scattergram of original and check values at a Witwatersrand mine

mean value of the original samples and that of the relevant check-samples taken either in the same groove or immediately adjacent thereto. It is also clear that there is a fair degree of correlation throughout the range of values—a low “original” giving rise to a comparatively low check-value, and a high “original” to a relatively high check-value. Fig. 1 also serves to demonstrate that mine check-samples display a larger absolute variability for high-grade and for low-grade values. Hence, because this phenomenon means in statistical language that the standard deviation of the check-sample differences (“original” minus “check-value”) is a function of the mean content of the duplicate samples, the application of standard control techniques for differences in dwt. per ton units becomes an impossibility.

Based on practical experience, the authors felt almost intuitively that the ratios of original to check-values constitute a more acceptable yardstick for comparing duplicate samples than do their differences. In due course, by using a logarithmic transformation of these ratios, control charts with limits spaced symmetrically about the centre line were developed and are already in operation in four of the mining groups.

These control limits are calculated for each mine and reef horizon separately, using a large number of check-sampling value pairs spread over all the samplers on a particular mine.

Basically, the statistical control chart is a device which shows up excessive variabilities and shifts in means. It “sounds the alarm” when an individual sampler fails to reproduce values from the same groove in accordance with the expected standard of work. If two samplers take check-samples in the same groove, the chart will show whether their work is unbiased against each other or whether over- or under-sampling is taking place. Furthermore, as each out-of-control pair of check-samples is re-assayed, it is possible, after plotting the ratio of both repeat assays, to say whether the assayer or the sampler was at fault.

As indicated by A. L. A. Forder<sup>3</sup>, the percentage of out-of-control points which, on re-assaying, shift inside the control limits, forms an effective and independent index of the quality of routine mine assaying.

The control chart may be usefully applied as a research tool. It may, for example, be desirable to examine the nature of over-sampling, dealing specifically with the question as to whether or not a Native chipper returns a less biased sample than a European sampler, or whether a learner sampler is sufficiently competent to work on his own.

In the past, such problems were “solved” by comparing the respective average values derived from the methods (or samplers’ results) being contrasted. The writers have shown that, unless the mean values are based on a very large number of pairs of samples (which is rarely the case), the results are frequently inconclusive and, at times, grossly misleading<sup>6</sup>. It is now known that where two sets of observations are to be compared, it is the relative number of value ratios above and below the centre line ( $R = 1$ ) that is the criterion. The explanation for the general failure of the previously used comparisons of mean values is attributable to the skew natural value distribution of ore *in situ*.

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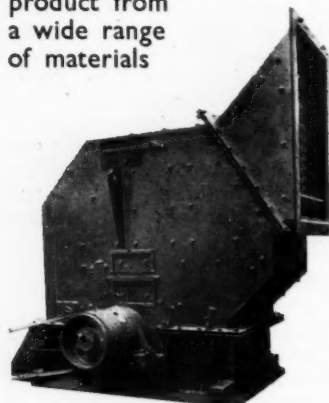


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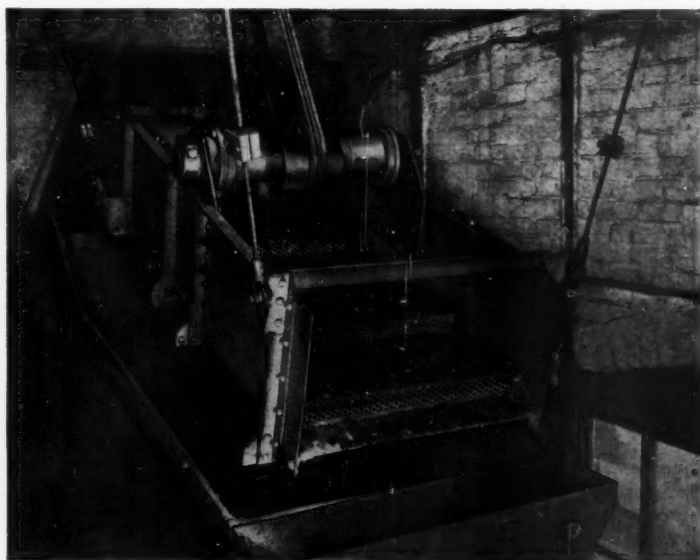
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The Peruvian government has made an arrangement for a year with the West German government for the exploration and subsequent exploitation of deposits of uranium near Cuzco. Germany will provide financial help to the extent of DM 134,000, five technicians and a mobile testing laboratory. Analyses of Peruvian uranium made in the U.S. and Germany are reported of high quality. Peru's technical assistance agreement with the U.S. for developing her uranium resources was allowed to lapse recently, thus permitting this new agreement.

★

A model of a new automatic system designed and built by English Electric apprentices, was demonstrated at the company's Thornbury works to 60 members of the Mining Electrical and Mechanical Engineers who were attending their annual convention at Harrogate. The working model was of a fully automatic system for the surface handling of coal. The mobile display is in a special demonstration van, fitted out by the Mining Division of the company, which is making a six months' tour of the mining areas in Britain. The new system will not displace men.

★

The Greek Aluminium Co., in which the French Pechiney-Compadec company holds a half-share, is to raise the question of curtailing or banning exports of bauxite from Greece. According to a survey carried out by the company, the ban on exports is essential for normal operation of the aluminium industry, and to ensure adequate supplies to the plant throughout the duration of the agreement.

★

Nickel consumption in the U.S. is increasing, according to Hanna Mining Co., sole U.S. domestic producer of the type of nickel used in making steel alloys. Increasing demand for stainless steels is expected to aid sales of the newly acquired smelting plant at Oregon, which Hanna Co. has been operating for the U.S. government since 1955. Last year some 47,500 s.tons of nickel were used in U.S. blast furnaces and rolling and finishing mills. The Hanna plant has a yearly capacity of 11,000 s.tons, compared with INCO, the chief supplier, with a capacity of 192,500 s.tons annually. Hanna's reserves at Oregon are estimated to be sufficient to supply the plant for the next 15-20 years.

★

Timna mines, in the southern Negev area of Israel, are at present producing almost 6,000 tonnes of copper, and it is expected that some 15,000 tonnes of copper annually will be produced in five years' time, when local requirements will have risen to about 10,000 tonnes. A group of 30 miners from Timna is to visit Western Europe later this year to train in coal, tin and iron mines.

The Rumanian government has now issued production figures of actual mineral output, instead of the percentages hitherto given. According to the Bucharest Chamber of Commerce monthly *Information Bulletin*, the following totals were achieved during 1960: Coal, 8,163,000 tonnes (an increase of 2 per cent over the 1959 figure); crude oil, 11,500,000 tonnes (1 per cent up); Methane gas, 519,000,000 cu. m. (13 per cent up); iron ore, 1,460,000 tonnes (37 per cent up); pig iron, 1,014,000 tonnes (137 per cent up); steel, 1,806,000 tonnes (127 per cent up); and soda ash 182,000,000 tonnes (72 per cent up).

★

President Frondizi has included the production of 4,000,000 tons of steel and 1,000,000 tons of coal as one of Argentina's objectives to be achieved for the next three years.

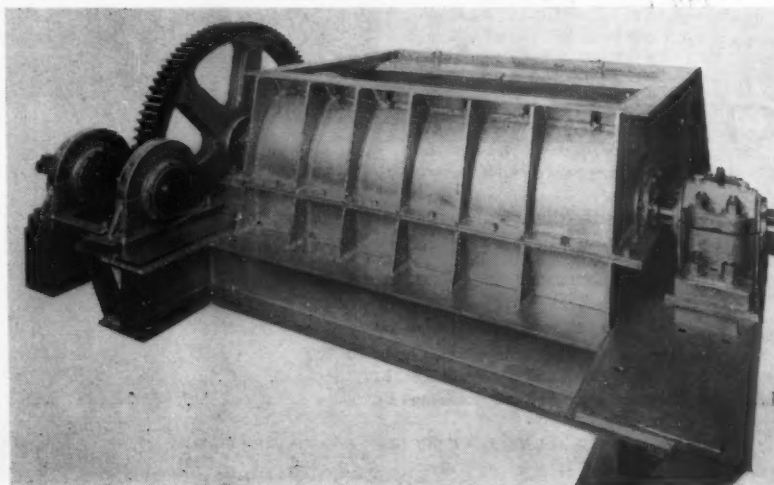
★ ★

Mining Production in Angola during 1960 included 25,000 tonnes of manganese and manganese-iron ores (compared with 38,300 tonnes produced in 1959); 18,900 tonnes of copper (18,500); 659,000 tonnes of iron ore (349,000); and 1,056,800 carats of diamonds (1,015,700).

★

General Beryllium Corp. of New York is acquiring some 260 claims and several state leases in the Spors-Topas Mountain area of Utah, amounting to approximately 5,500 acres, constituting one of the largest claim holdings in the area. The claims are about 50 miles north-west of Delta and 100 miles south-west of Salt Lake City, in an area where several beryllium mining companies are working. General Beryllium has begun an extensive surface and underground development programme to determine the extent of the beryllium-bearing zone.

The General Electric Co. Ltd. of England has recently shipped to Africa two identical 60 in. x 24 in. Pennsylvania single-roll crushers (as illustrated) specially developed for handling hot zinc-lead sinter. These crushers, which were manufactured at the company's Fraser and Chalmers Engineering Works, were ordered by Messrs. Lurgi of Frankfurt and are for installation in two updraught sinter plants at Broken Hill, Rhodesia. When operating, each crusher will be fed with hot sinter from a pallet 59 in. by 39 in. by 12 in. and, according to its setting, will give a product size of either 3 in. or 4 in. at a rate of 48 t.p.h.



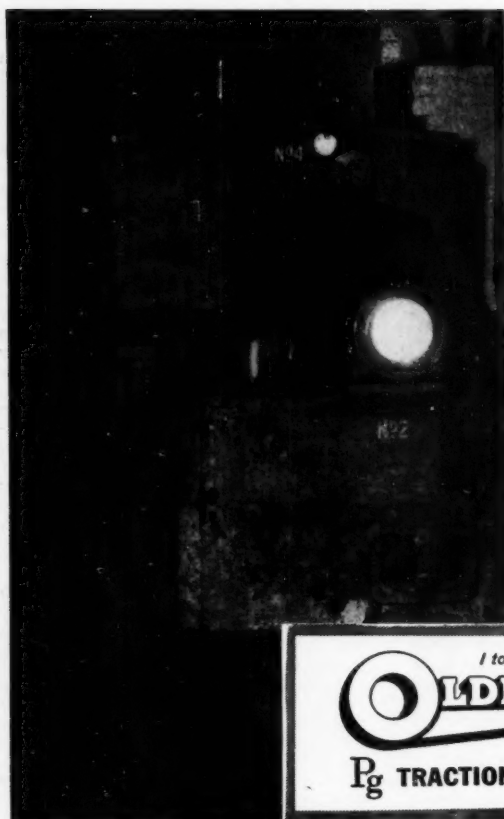
Mining in the Siberian northern regions of Russia has commenced about two weeks earlier this year, owing to milder weather. A large geological prospecting party is journeying from Tiksi to the Olenek basin, in search of kimberlite pipes. In Chukotka, gold mining is already proceeding, and on the Komsomolskii gold placer, several large nuggets (two weighing over 200 grammes each), have been found.

★

In the British Standard Methods of test for toxicity of wood preservatives to fungi (B.S.838:1961), which has now been published in a revised form, the wood block method has been retained for basic testing, but procedures are now given for determining both the initial toxicity of wood preservatives and the residual toxicity after leaching and evaporation. A test for toxicity to soft-rot microfungi is also included. Copies of the standard may be obtained from the Sales Branch of the British Standards Institution, in London or Manchester, price 7s. 6d.

★

The chairman of the Economic Council in Moscow announced recently that the lead ore and metal output in the Altai region of East Kazakhstan is to be doubled, according to the *Economic Gazette*. The Altai region is one of the richest areas in the Soviet Union for metal deposits. As the extraction rate in East Kazakhstan is already high, amounting to 94.3 per cent for lead, 91 for zinc, 93 for copper, 98 for gold and 99 per cent for silver, it is proposed to raise output, without increasing costs unduly, by better exploitation of shallow deposits, of which there are many in the Altai region, by improving concentration processes and by extracting metals from foundry slags. This course is expected to yield large additional quantities of zinc, lead and copper, as well as of selenium, indium, cadmium and tellurium.



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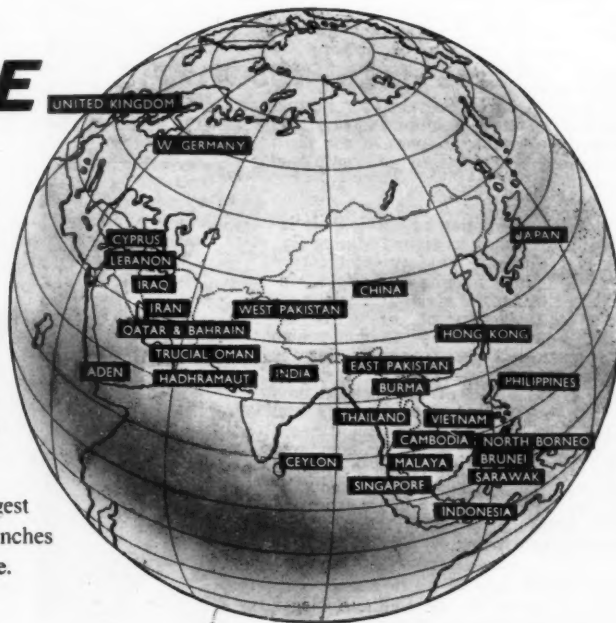
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## Machinery and Equipment

# Large Belting Order for N.C.B. Completed

Over 4,500 ft. of Tuflex fire resistant conveyor belting has been supplied to the National Coal Board by BTR Industries Ltd. for Pit House Drift — one of the N.C.B.'s largest and most important installations. Tuflex, B.T.R.'s latest development in conveyor belting, is a patented construction consisting of a continuous filament stress member with a cotton cover warp and a continuous filament nylon weft and represents a major departure from conventional methods.

The drive unit at Pit House Drift is a Meco 300 h.p. unit with an electrically controlled scoop-type hydraulic coupling. The length of the conveyor is 2,199 ft. 4 in. between centres, the gradient of the drive varies from being almost flat at load point to 1 in 4.36, and the total lift is 478 ft. Without shock or surge the belt can be accelerated to 421 f.p.m. in 10 sec. and can be stopped smoothly under capacity load in 5 sec.

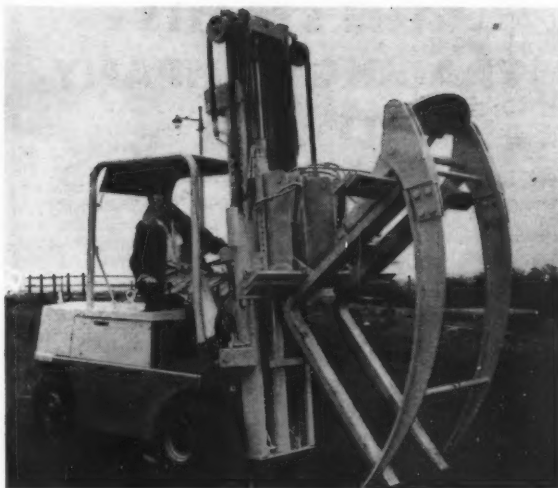
The belting supplied is of 3-ply construction only, but has a breaking stress of over 6,000 lb./in., is designed to operate at a maximum tension of over 600 lb./in., and was manufactured by BTR in four lengths each of approximately 1,200 ft. and weighing 5 tons.

The belt has been on trial at full capacity since last autumn, handling approximately 12,000 tons weekly. To date it has handled over 350,000 tons trouble-free.

### PIT-PROP ATTACHMENT

An interesting addition to the Hydrum range of mechanical handling equipment is the pit-prop attachment, details of which have been released by the manufacturers, R. H. Corbett and Co. Ltd.

The "Hydrum" pit prop attachment



This attachment was designed primarily to handle pit props. It is hydraulically-operated from the system of the truck to which it is fitted, the piping requirement being that the truck can run four hoses over its mast and can incorporate two additional valves which are used to control the hydraulic circuit to the rams. It is anticipated that a standard hanging arrangement will be available for trucks using a plate-type carriage and that this arrangement will add only 1½ in. to the attachment's inherent loss of load centre of 13½ in.

The attachment's forks are rated for a maximum load of 2 tons at 24½ in. from the fork heels but the true capacity, in terms of a particular truck, can be found from this formula:

$$A \text{ (lb.)} \times (B + 15 \text{ in.}) + 32,705 \text{ lb./in.} \\ \text{truck load centre (in.)} \\ = \text{truck capacity (lb.)}$$

BTR Tuflex conveyor belting at Pit House Drift, Durham



where A is weight of load to be lifted, B is the distance from the rear of the load to its c. of g. and the factor of 32,705 lb./in. is a constant obtained by multiplying the attachment's weight (2,110 lb.) by the distance its c. of g. is set forward from the rear of the hanging bracket (15½ in.). Basically, the attachment comprises a backplate assembly which is mounted on the truck, a front frame, a twin-claw assembly and the forks. Four rams, of 4 in. bore are utilized to actuate the claws and the forks. The overall height (closed) and width are, respectively, 65 in. and 55 in., and the forks measure 49 in. from heel to toe.

### NEW REBOUND HOSE

A water suction hose designed especially for use where hose is subjected to damage from lorry movements is being marketed by Goodyear of America.

Identified as "Rebound" because it springs back to its original shape after being completely crushed, the hose is being produced in lengths up to 25 ft., and in 1½ in. and 2 in. dia. The shape of the hose is maintained by a specially treated rope helix embedded in heavy rubber between the two plies of fabric reinforcement. The helix also prevents collapse of the hose at high vacuum.

The interior tube of the hose is a non-porous rubber compound that resists action of sand and grit and also is impervious to mildly acid or alkaline water. While stocked with straight ends only, it can be furnished with enlarged ends. This hose is at present not marketed in Great Britain.

Four years ago MATBRO embarked on the production of the world patented 4 wheel drive 4 wheel steer Mastiff loading shovel, a limited number of which were put in the hands of users in England, the Common Market, South America, Canada, South Africa and North Africa.

As a result of these experiences, a new Series II Mastiff has been designed, thoroughly tested, and is now in the course of production. Working load has been increased by 25 per cent, i.e., to 5,000 lb. and 1½ cu. yd. S.A.E. bucket.



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## MAP OF THE GOLD MINES OF THE KINROSS AREA

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- the exact position of each mine on the field.
- where on each property boreholes have been sunk, and what has been the core recovery on reef intersection.
- what shafts are being sunk.

Accompanying this map is a small outline map, bringing the borehole results up-to-date as at October 1960.

★While a mine is at the development stage, it is of vital importance to have a visual picture of its position in relation to the field as a whole. Otherwise the quarterly results published by the companies lose much of their significance.

★Results reported from adjacent mines often have a direct bearing on the one in which you are interested, which, however, can only become apparent if you have clearly in mind the position of the properties in relation to one another.

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## Metals and Minerals

### The Outlook For Steel

Steel is one of the most reliable economic barometers and also the largest outlet, in varying degree, of the ferro-alloy metals. Understandably, therefore, the steel industry's progress is watched, sometimes with almost hypochondriacal attention, by economists, industrialists and mineral producers. Of particular significance at the present time is the rising trend in U.S. production, which if continued, must be reflected sooner or later in more active markets for chromite, manganese ore, and other metals and minerals consumed in the steel industry.

World steel production rose last year to the all-time peak of 355,566,000 net ingot tons—11 per cent higher than the previous record set up in 1959. U.S. output, however, was substantially below that of the previous year, amounting to only 99,300,000 s. tons against 93,400,000 s. tons in 1959.

According to the Commerce Department at Washington, world steel production, excluding Communist China and North Korea, totalled 86,341,000 net tons in the first quarter of 1961, a decline of 12 per cent from the first quarter a year ago when output was 97,894,000 tons. This sharp drop is accounted for by the lower U.S. output, which at 19,741,000 was 15,000,000 tons below that of the first quarter of 1960, the high figure recorded for the latter period reflecting the aftermath of the prolonged steel strike. Throughout the greater part of the year U.S. steel production trended steadily downwards and in some weeks the industry was operating at less than half capacity. This disappointing performance, however, was more than offset by rising production in the U.K., Western Europe and elsewhere.

During the past three months there has been a substantial recovery in U.S. steel production, which rose for eleven consecutive weeks to 2,037,000 tons, representing around 71 per cent of 1961 estimated capacity, in the week ending May 17. There is unlikely to be any significant advance during the early summer, chiefly because motor car manufacturers are expected to curtail their steel buying in preparation for model changeovers. From July onwards, however, the market is expected to make further headway. According to Mr. T. F. Patton, president of Republic Steel Corp., during the first six months of 1962 production could run at a weekly rate of 2,400,000 tons.

In the United Kingdom steel output is still running slightly below last year's level and a recovery is not expected until the autumn. Consumption is being well maintained, however, despite contracting order books for a variety of steel products, and may even rise slightly when demand from the motor car industry recovers. On the other hand, Japan's April output is believed to have been an all-time record, while increases are also expected in Europe in the second quarter. Present indications suggest, therefore, that world steel output should be significantly higher during the second quarter.

Steel, in common with most other engineering materials, is faced with stiffening competition both from other metals and from plastics. This challenge

is being met by speeding up the development of new products of greater durability, reliability, strength and utility. Last month, Dr. T. P. Magel, of Allegheny Ludlum Steel Corporation, told the American Institute of Mining, Metallurgical and Petroleum Engineers that the many steel products recently introduced were only the "vanguard of a much larger and faster flow of new and improved alloys that will be forthcoming from the steel industry during the next few years". New products of Allegheny Ludlum include a bright-annealed stainless steel, another new stainless steel developed for superior corrosion resistance, and a new alloy for use in motor car mufflers for which the outlook is claimed to be very promising. Dr. Magel also referred to "coated steels, clad steels, textured surface steels, coloured steels, super-high-strength steels, and steels (in sandwiches) with aluminium, copper and many other metals".

Allegheny Ludlum recently dropped something of a bombshell in the American steel industry by announcing price cuts ranging from 1½ c. to 4 c. a lb. on most grades of cold rolled stainless strip, effective May 29, 1961. The example is being followed by other U.S. producers. Cold-rolled strip is the most important stainless steel product, probably comprising about half of all stainless steel sold. The reductions should help producers to obtain a greater share of the important motor car trim market.

Looking ahead, the ambitious plans for the expansion of steelmaking operations, in developing countries as well as in the established steel producer nations, suggest that producers and exporters of the ferroalloy metals and minerals can look forward to growing markets in the years ahead. The stainless steel industry in the U.S. was particularly hard hit by the recent recession. Its improving prospects are a further bull point for nickel and chromium.

### WOLFRAM GAINS MORE GROUND

The uptrend in wolfram prices, noted in our last week's issue, has continued. Most dealers in London now indicate a range of 127s.—131s. per 1-ton unit c.i.f. Europe compared with 123s. 6d.—127s. 6d. several weeks ago. The rise is far from excessive, however, for historically wolfram is notorious for big movements either way, and the present one is considered modest by dealers. Business is understood to have matured at 127s. to almost the top end of the range.

In the short-term, some dealers feel that prices could move up by a few more shillings by the end of June. Over the past month a lot of ore has been sold to the Continent, and the U.K.—over the past week it is estimated that some 180 tons has changed hands. In consequence, shippers are reckoned not to have much fresh material to offer for the time being.

The rise in price has taken place in spite of the reported availability of ore from Russia, but this factor is not as important as it would seem since buyers only cover part of their requirements from that source in consideration of their longer

established sources of supply elsewhere.

Reflecting the higher shipment price the U.K. domestic prices for ferro-tungsten (80-85 per cent) and tungsten metal powder (98-99 per cent) 80 mesh steel-making quality have been advanced by 4d. per lb. making ferro-tungsten 10s. 3d. and tungsten metal powder 13s. 3d.

### RISE IN MANGANESE FREIGHTS

In an otherwise uneventful manganese market, the only noteworthy development has been a rise in the Indian Conference line freight rate for manganese dioxide by 17s. 6d. to 98s. 6d. per 1,000 kilos to main Continental and U.K. ports, as from June 1. Understandably this increase has not met with a uniformly favourable reception from the trade, since it comes at a time when sales of Indian material have been declining because of competition from other sources, notably Egypt and Morocco.

★

The Japanese Ministry of Trade has authorized the import of 180,000 tons of manganese ore and 40,000 tons of ferro-manganese under the import budget covering the first half of the current financial year, which started on April 1. This was the first import authorization of manganese ore for this financial year. Meanwhile, eight leading Japanese ferro-alloy makers have jointly concluded contracts with the Soviet Union to import a total of 9,000 tons of manganese ore this year. Import prices were fixed at the same levels as last year's purchases of 10,000 tons. Ore of 46-48 per cent manganese content was priced at \$U.S.37.50 per ton, c.i.f. Japan, and 44 per cent material at \$29. Four of the eight producers are reported to have imported about 3,000 tons of manganese ore from Brazil for the first time, the price being \$44.50 per ton c.i.f. Japan for ore of 50 per cent grade.

A Japanese Trade Ministry official has referred to the likelihood that imports of manganese ore and ferro-manganese might be freed at an earlier date than had been expected, because of a strong request from local consumers. It had been anticipated that the import liberalizations would be carried out after 1963.

### INDIAN ILMENITE

We are advised by Travancore Minerals Private Ltd. that they are exporting large quantities of ilmenite to the U.K. and U.S. markets. Two grades are produced, one known as the "Q" grade being guaranteed to contain 58-60 per cent TiO<sub>2</sub>, and the other, known as "MK" Grade, having a guaranteed TiO<sub>2</sub> content of 54 per cent. The f.o.b. charges for the two grades are respectively 113s. 6d. per ton (port of shipment Kollthottam) and 95s. per ton (port of shipment Colachel).

### U.K. EXPORT CONTROLS

The Board of Trade has announced a number of changes in export licensing which came into force on June 13, 1961. Export control is removed from molybdenum disulphide, while the descriptions of goods to which export control applies have been amended to include molybdenum and niobium. These changes are in the main consequential on a number

of amendments to this list of goods subject to embargo for the Soviet bloc and Mainland China published by the Board of Trade at the beginning of May.

#### NICKEL PLANT FOR ALBANIA

The Albanian authorities are understood to be planning the erection of a nickel refinery near Tirana. Negotiations are taking place for the plant to be built with Communist Chinese aid. News of this plan, revealed by Yugoslav sources in Belgrade, follows the offer of Czechoslovakia to support the development of the Albanian nickel industry up to the end of 1965 (See *Mining Journal Annual Review*, 1961) and a report of arrangements to process Albanian nickel ore in Slovakia (See *Mining Journal Annual Review*, 1960).

Sherritt Gordon are shortly to start commercial shipments of nickel and cobalt products rolled from powder. The company's powder mill at Fort Sas-

katchewan has been operating as a pilot plant to develop operating techniques for the production of cobalt and nickel strip, rod and wire.

The company claim that by using powder consolidation techniques they will be able to manufacture a number of nickel, cobalt and copper alloys and composite materials for a great variety of applications, some of them of a kind and quality not made before, for instance in the electronics field, in fuel cells and high temperature applications.

Sherritt's nickel output in the first quarter of this year was 2,800 s.tons against 4,200 s.tons in the corresponding period of last year.

Recently it was announced that the U.S. government stockpile of some 3,500 tons of nickel-cobalt calcines located near Fredericktown, Mo., had been purchased by Sherritt Gordon for \$700,000. The calcines contain 19 per cent nickel and 13 per cent cobalt and have been declared excess to the national stockpile. Sherritt will move them to its own nickel and cobalt refinery at Fort Saskatchewan, Alberta.

#### BERYLLIUM OXIDE

The Beryllium Corporation of Reading, Pennsylvania and United Technical Industries, Murray, Utah, have signed an agreement for a joint venture to produce beryllium oxide by a new chemical process developed and owned by United Technical.

Initially, the companies will operate a processing plant nearing completion in Delta, Utah, costing about \$1,000,000. The plant will be supplied from the reserves of beryllium-bearing clays on United Technical Industries property in the Spors-Topaz mountain area of South West Utah. The capacity of this plant will be around 30,000 lb. of beryllium oxide a month. Beryllium Corporation and United Technical will share equally the construction cost of this plant and costs of development and exploration of the orebody.

Expansion of the treatment facilities is included in the plans for the new enterprise. It is contemplated that about \$3,000,000 more may be spent to increase the beryllium oxide output.

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## Copper • Tin • Lead • Zinc

(From Our London Metal Exchange Correspondent)

With the exception of tin, all metal prices have shown a tendency to fall back during the last week. Although it is difficult to pin-point the reason for this, sentiment seems to be tending towards viewing the near future in a not too optimistic light.

## COPPER PRICES REACT

At the end of last week there was a distinct firmness in the copper market brought about by news that there was still a possibility of labour trouble at El Teniente and that a strike had broken out at one of the Cerro de Pasco plants. After the weekend, however, settlement was reached in both disputes. Almost at the same time it became known that the Union negotiating with Kennecott for a new contract to replace the one expiring at the end of this month had agreed that working should continue on a day-to-day basis, even if no agreement has been reached by June 30. A warning was added, however, that if negotiations were not successfully concluded there would probably be a strike called at the end of July or early August.

This news brought a reaction in both London and Comex prices of copper, and reports indicate that business in physical copper in the U.S. has been done at slightly under the 31 c. per lb. mark. At the same time some custom smelters have reduced the intake price of copper scrap to 26½ c. per lb., which indicates that the rise in price which was confidently anti-

cipated a few weeks ago is no longer imminent. Demand from the European Continent and Japan remains steady, with wirebars standing at a premium of £4 in the former market and £12 to £14 in the latter.

In London there has been a tendency for the contango to widen, and this may be connected with the necessity for firms to obtain more cash to finance their tin position. Stocks in official warehouses rose 350 tons to a total 16,877 tons.

## SUBSTANTIAL SALES FROM BUFFER STOCK

The tin market has occupied the centre of the stage this week with the cash price being held at £880 per ton by sales from the buffer stock and with the three months price remaining about £10 higher. A feature of the market has been the purchasing of intermediate dates, the demand for which has been largely satisfied by purchases of cash and a corresponding re-sale for the date required at a price giving the purchaser of the cash an economic return on the outlay involved. This has meant that purchasers of metal for July and August have had to pay a substantial premium over the cash price. The tonnage of cash metal sold has been fairly heavy, and with only vague talk from America that the 4,000 tons may be released sometime in the near future, talk is now being heard about a possible clear-out of the buffer stock with a consequent sharp rise

in the price above the present levels. It is possibly prudent to think on these lines, but the tin market is notorious for the unexpected happening.

The fall in stocks continued and at the beginning of the week totalled 8,734 tons, which was 175 tons below the previous week's figure. The latest statistics have not helped the position in any way, as mine production in Malaya in April is given as 4,436 tons of tin in concentrates as opposed to 4,512 tons in March. At the same time stocks of metal and metal in concentrates at the end of April totalled 10,487 tons as compared with 11,771 tons in March. The position in Bolivia has also been clouded by a declaration of a state of emergency which, however, seems unlikely to further hamper tin mining for the time being.

On Thursday the eastern price was equivalent to £895½ per ton c.i.f. Europe.

## LEAD-ZINC AT LOWER LEVELS

The prices of both lead and zinc had relatively sharp falls during the week but a steadier undertone developed at the lower levels. Stocks of lead fell by 225 tons to a total of 11,393 tons, whilst zinc stocks fell 185 tons to 7,726 tons. Demand for both metals is of a very routine nature, but the zinc market may be subjected to additional pressure through the appearance of metal from behind the Iron Curtain as a result of a barter deal, to which may be added some re-sales by Continental consumers, who appear to have over-bought in the earlier months of the year.

In America reports on the lead market remain favourable, but the zinc market is still affected by sales of the higher grades of zinc at a discount below the quoted price. The position was such at the beginning of the week following a fall in London that some of the leading sellers felt obliged to issue a statement that the base price of 11½ c. per lb. East St. Louis was not likely to be altered as demand for the grade of zinc covered by this price remained good. There now seems to be a possibility that a shipping strike may break out in the U.S. at the end of this week, and should this prove correct and be of long duration, it may mean that the London market will have to accommodate some tonnages of metal diverted from the U.S. ports.

## OFFICIAL TURNS

Official turnovers (in l.tons) for the week ending June 9, with the previous week's figures in parentheses, are:—

Copper	15,150	(13,975)
Tin	2,740	(885)
Lead	9,050	(7,350)
Zinc	10,950	(6,150)

Closing prices are as follows:

	June 8		June 15	
	Buyers	Sellers	Buyers	Sellers
<b>COPPER</b>				
Cash	£238	£238½	£235½	£235½
Three months	£240½	£240½	£237½	£237½
Settlement		£238½		£235½
<b>LEAD</b>				
Current ½ month	£64½	£64½	£63½	£63½
Three months	£66	£66½	£64½	£64½
<b>TIN</b>				
Cash	£879½	£880	£879½	£880
Three months	£890	£891	£887½	£888
Settlement		£880		£880
<b>ZINC</b>				
Current ½ month	£80½	£80½	£77½	£78
Three months	£81½	£81½	£79	£79½

## LONDON METAL AND ORE PRICES, JUNE 15, 1961

## METAL PRICES

Aluminium, 99.5%, £186 per ton	Magnesium, 2s. 2½d./2s. 3d. lb.
Antimony—	Manganese Metal (96%/98%) £275/£285
English (99%) delivered, 10 cwt. and over £230 per ton	Nickel, 99.5% (home trade) £600 per ton
Arsenic, £400 per ton	Osmium, £18/£22 oz. nom.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Osmiridium, nom.
Cadmium 1½d. 0d. lb.	Palladium, imported, £8 12s. 6d.
Cerium (99%) net, £15 0s. lb. delivered U.K.	Platinum U.K. and Empire Refined £30 5s.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.	Imported £28/£28½
Cobalt, 12s. lb.	Quicksilver, £67 ex-warehouse
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram	Rhodium, £43/£45 oz.
Gold, 250s. 0½d.	Ruthenium, £14/£16 oz. nom.
Iridium, £20/£23 oz. nom.	Selenium, 46s. 6d. per lb.
Lanthanum (98%/99%) 15s. per gram.	Silver, 79½d. f. oz. spot and 80d. f.d.
	Tellurium, 37s. 6d. lb.

## ORES AND OXIDES

Antimony Ore (60%) basis	30s. 0d./35s. 0d. per unit c.i.f.
Beryl (min. 10 per cent BeO)	270s./275s. per l. ton unit BeO
Bismuth	65% 8s. 6d. lb. c.i.f.
Chromite Ore—	18/20% 1s. 3d. lb. c.i.f.
Rhodesian Metallurgical (semiriable 48%) (Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
Hard Lumpy 45% (Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
Refractory 40%	£11 0s. 0d. per ton c.i.f.
Smalls 44% (Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Baluchistan 48% (Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1)	Nb <sub>2</sub> O <sub>5</sub> : Ta <sub>2</sub> O <sub>5</sub> 165s./167s. 6d. per l. ton unit c.i.f.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF <sub>2</sub> )	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 3½% Li <sub>2</sub> O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li <sub>2</sub> O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Ambygonite basis 7% Li <sub>2</sub> O	75s./85s. per ton f.o.b. Beira
Magnetite, ground calcined	£28 0s./£30 0s. d/d
Magnetite Raw (ground)	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46%-48%) basis 60s. 0d. freight	73d./75d. c.i.f. nom.
Manganese Ore (43%-45%)	69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)	nom.
Molybdenite (85%) basis	10s. 0d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO <sub>2</sub> (prompt delivery)	£23½ per ton .i.f. Aust'n
Ilmenite 50/52% TiO <sub>2</sub>	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	127s. 0d./131s. 0d. per unit c.i.f.
Vanadium—	
Fused oxide 95% V <sub>2</sub> O <sub>5</sub>	7s. 6d./8s. per lb. V <sub>2</sub> O <sub>5</sub> c.i.f.
Zircon Sand (Austalian) 65-66% ZrO <sub>2</sub>	£16 ton c.i.f.

## Mining Finance

### Malayan Prospecting Activity Increases

The Singapore price of tin is over £900. The buffer stock manager has disposed of almost 1,000 tons during the past week. A Malayan government spokesman has disclosed that a record number of prospecting licences were issued during the past year. It is against this background that we read this week the statement of the chairman of the Malayan Chamber of Mines. (See page 712.)

The spokesman for the Malayan Mines Department has said that 475 permits covering an area of 375,500 acres have been issued. This represents a considerable increase in the prospecting activity in Malaya, no doubt sparked off by the relaxation of the export quotas under the International Tin Agreement. It is undoubtedly essential that prospecting is continued in Malaya, but it must be appreciated that although the addition to the tin reserves is a function of the prospecting activity, the point has been reached in Malaya where it seems increasingly unlikely that any new deposits of a major significance will be found. Whilst it is only since the last war that some of the mines have been developed there have, in fact, been no major discoveries of new areas since 1939.

More important probably, is whether the increase in the number of licences issued reflects a change in official thinking, which could be the forerunner of a relaxation of the land alienation policy. If this is the case it could well be that

certain likely tin bearing areas, which are at present restricted to agricultural purposes, would become available for mining.

At best any new areas found would probably be low grade and it is in this context that Mr. E. D. Shearn has attacked the increase in export duty. The difficulties which this tax introduces were discussed in these columns in our issue of June 2, 1961, the main problem being that it is a discriminatory tax levied on production rather than profits.

### BRITISH BORNEO PROFITS INCREASE AGAIN

British Borneo Petroleum Syndicate can in some ways be compared with the British South Africa Company. Over 50 per cent of its revenue is derived from royalties received from the Brunei Shell Petroleum Company, the company being entitled to receive a royalty of 1s. per ton on the oil production of Brunei Shell in the State of Brunei. The Seria field was discovered in Brunei in 1929 and, whilst production still continues at a high level, recent drilling has not been encouraging and the revenue from royalty must, over the years, decline.

With this in view the company has been actively investing in the equities of other oil and mining companies, the stock exchange value of its portfolio at present being £2,382,471. In his annual state-

ment, the chairman, Mr. C. L. Nelson has given the following analysis of these holdings. Oil companies, 61 per cent; mining finance and mining companies 23½ per cent; U.K. industrials 15½ per cent. The dividends and interest on these investments increased by £25,000 during the past year to £129,022.

The company's holding of Apex (Trinidad) shares has been acquired by British Petroleum, one ordinary B.P. share plus 4s. 6d. in cash being received for each Apex share. The cash received has been included in the profit for the year to March 31, 1961.

### SOUTH AFRICAN PRODUCTION RESULTS

Comparison of results of the South African gold mining industry for the first quarter of 1961 with those of the same period of the previous year, published on this page (left) shows that the expansion of the industry is being maintained in all phases. Despite the further rise in working cost levels, and the drop in uranium profit, the overall profit level of the industry has again improved.

A disappointing increase, however, is in the native labour strength which has increased to 399,000. This increase is partly accounted for by the addition of F.S. Saaiplaas to the ranks of the producers for the first time this quarter, but there has even so been a net increase of 8,000 natives. This increase is particularly marked in the newer mines and is to some extent seasonal. The additional labour is being used to boost the rate of development, and to build up reserves against a possible seasonal labour shortage.

### SOUTH AFRICAN GOLD AND URANIUM PRODUCERS

Comparison and analysis of results for first 3 months of 1961 and 1960

Heading			Jan. to Mar.	Rand Cos.	Klerksdorp Cos.	O.F.S. Cos.	Total
Tons milled :	Millions		1961	11.9	2.2	3.8	17.9
			1960	12.3	1.9	3.3	17.5
Ounces produced :	Millions		1961	2.8	0.9	1.7	5.4
			1960	2.7	0.8	1.5	5.0
Grade per ton :	Dwt.		1961	4.7	8.0	9.0	6.0
			1960	4.5	7.9	9.1	5.8
Working costs per ton :	s. d.		1961	43/-*	61/7	60/9	49/4*
			1960	40/4	60/11	60/7	46/5
Working Profits :	Gold	£m.	1961	10.7	4.6	10.0	25.3
			1960	10.0	3.8	9.0	22.8
Working Profits :	Uranium and acid :	£m.	1961	2.4	2.4	1.8	6.6
			1960	2.5	2.9	1.9	7.3
Total		£m.	1961	13.1	7.0	11.8	31.9
			1960	12.5	6.7	10.9	30.1
Dividends declared :		£m.	1961	0.3	—	8.2	8.5
			1960	—	—	8.0	8.0
Non-European employees at end March :			1961	252,000	58,000	89,000	399,000
			1960	254,000	55,000	80,000	389,000
Number of Cos. included :			1961	38	7	11	56
			1960	38	7	10	55

\*1961 Working Costs exclude 4 Primarv Uranium Producers (Dominion Reefs : East Champ : Luipaards Vlei : Randfontein) as these figures are not available.

### AMPAT'S CAPITAL REPAYMENT

As a result of the relaxation of tin export control throughout 1960 and the complete suspension of controls in October 1960 Ampat were able to sell not only their entire production for the year but also the minehead stocks that had been carried forward from 1959. The total sales of tin concentrates during the year amounted to 1,059½ tons giving a total revenue from the sale of tin of £618,895 (1959—£390,864). The revenue from tributing and sundry receipts added a further £44,312.

In order that the finance might be available for new mining areas Ampat have built up considerable cash reserves over the past years and at the date of the balance sheet (December 31, 1960) the net current assets stood at £473,146. However, the directors are of the opinion that the prospects are not sufficiently promising to warrant the retention of this sum and have therefore recommended a capital repayment of 3s. 0d. per share. This will absorb £187,500, leaving net current assets of £285,646. The present par value of Ampat shares is 4s.

As the combined dredging reserves for the Kent and Batu Caves units have been estimated at between four and six years it has been decided to work this area with the Kent dredge only. Accordingly the Batu dredge, which has remained on a care and maintenance basis since December 17, 1957, will be dismantled and the plant sold. The Bidor dredge was brought back into production in January 1960 and continued operating throughout the year. This dredge will exhaust its reserves in about two years time. The Tujoh plant has remained under care and maintenance but por-

tions of the area are being worked on a tribute basis.

The results for 1960 have been exceptional as they include the sale of the minehead stocks. The results for the current year are likely to be lower than those of 1960, not only due to the fact that this additional source of revenue from stocks cannot be repeated but also as the Bidor dredge was closed down for extensive repairs for two months early this year. However the improved price of tin should considerably compensate for this loss. The average price realized for the metal during 1960 was £769 17s. 6d.

## SOUTH AFRICAN MONTHLY RETURNS

The main feature of the May returns of the South African gold mines is the number of record tonnages that have been recorded. At Doornfontein the increase was small but is part of the expansion programme to build the milling rate up to 125,000 tons per month during the coming year. The F.S. Saaipiaas tonnage was increased from 54,000 tons to 56,000 tons, this together with an increase in the grade resulted in the profit for the month being raised at £3,532.

In the Union Corporation group both St. Helena and Winkelhaak had a record tonnage milled. At Saints this gave rise to a record profit of £437,643.

## KAFFIR DIVIDEND SEASON

The mid-1961 half-yearly South African gold-mining dividend season has not been a remarkable one, but it has at least been a further indication that the earnings of the mines plough steadily on undisturbed so far by the political and economic stresses that surround the industry and which we have discussed on page 681. Before reviewing the payments it is as well to bear in mind that the old practice of declaring twice-yearly dividends based on half-yearly earnings seems to have been abandoned by all the groups. The policy now is to declare interims and finals with the payment at the end of the financial year consequently tending to be larger than that made half way through the period.

The rate of dividend growth for the newer mines is now slowing down, pending the completion of further major expansions in treatment capacity, while the onset of tax is also playing quite a part in the dampening down of increases. This is particularly so in the Orange Free State field. But the mines there have different dividend seasons, in March and September, so they are not reporting now.

There is little doubt which is the most outstanding among the current announcements. It is that of West Driefontein the giant Far Western Rand producer. This company has been a heavy tax payer for some time now—over 50 per cent of the profits go to the government—but this has not prevented the steady upward march of dividends.

West Driefontein can, in fact, still make the remarkable boast that it has raised every half-yearly payment since dividends started eight years ago in 1953. The latest, of 3s. 1.2d. per 10s. share, compares with 2s. 10.8d. in December and with 2s. 7.4d. a year ago as the accompanying table shows. Current profits of over £1,000,000 a month gross

(Continued on page 705)

## Rand and Orange Free State Returns for May

### GOLD OUTPUT AND PROFIT

Company	May 1961			Year ends	Current Financial Year Total to date			Last Financial Year Total to date		
	Tons (000)	Yield (oz.)	Profit† (£000)		Tons (000)	Yield (oz.)	Profit† (£000)	Tons (000)	Yield (oz.)	Profit† (£000)
<b>Gold Fields</b>										
Doornfontein	118	49,849	283.0	J	1,198	496,946	2713.7	1,055	428,585	2129.8
Libanon	118	28,786	76.5	J	1,287	310,482	797.8	1,233	290,686	692.5
Rietfontein	12	3,291	1.3	D	60	16,248	7.0	80	20,966	32.9
Robinson	44	9,774	1.0	D	212	48,305	6.4	226	48,401	112.6
Simmer & Jack	70	12,691	10.5	D	348	63,416	11.3	384	67,813	148.9
Sub Nigel	66	15,049	12.7	J	726	165,432	154.3	726	169,600	205.6
Venterspost	125	36,844	93.3	J	1,338	381,507	890.2	1,377	350,795	672.2
Vlakfontein	53	19,582	93.9	D	260	95,974	463.0	257	91,823	434.9
Vogels	81	17,370	13.1	D	405	86,607	71.3	430	92,309	103.2
West Drie	157	132,353	1130.1	J	1,468	1,360,577	11941.0	1,230	1,128,831	9687.2
<b>Anglo American</b>										
Brakpan	146	18,355	25.3	D	713	89,332	102.3	710	85,859	60.2
Daggas	228	46,092	230.4	D	1,127	228,091	1131.4	1,159	233,803	1139.9
East Daggas	108	18,468	41.8	D	536	91,632	211.5	524	88,794	201.5
F. S. Geduld	98	85,604	690.2	S	766	667,188	5429.8	750	643,534	5156.0
President Brand	126	98,910	840.5	S	962	760,363	6593.5	925	755,087	6637.0
President Steyn	110	41,251	166.1	S	858	320,929	1357.8	814	318,131	1448.9
S.A. Lands	112	22,517	52.0	D	530	107,670	252.5	479	99,598	211.5
Springbok	94	13,086	20.0	D	466	64,350	80.4	515	71,704	74.3
Vaal Reefs	106	49,322	267.7	D	519	243,097	1319.6	476	214,200	1112.3
Welkom	100	32,300	65.1	S	784	249,253	537.4	779	245,753	583.8
Western Holdings	173	118,938	1005.4	S	1,301	891,235	7606.6	1,153	762,133	6284.1
West. Reefs Ex.	155	45,183	157.3	D	738	214,495	721.4	690	194,184	643.5
<b>Central Mining</b>										
Blyvoor	144	91,441	691.8	J	480	957,781	7309.3	1,397	916,846	6949.4
City Deep	115	24,064	2.8	D	564	117,468	18.9	559	116,319	27.3
Cons. M.R.	44	9,925	2.3	J	548	116,990	35.9	910	175,936	73.4
Crown	175	30,780	0.8	D	910	158,347	6.5	994	166,759	22.0
D. Roodepoort	199	37,202	52.3	D	951	175,905	248.7	955	174,671	246.6
East Rand Prop.	252	55,813	75.1	D	1,178	261,492	312.1	1,088	275,617	447.8
Harmony	200	81,551	399.8	J	1,920	778,897	3708.7	1,595	637,835	2835.7
Modder East	61	6,458	1.2	J	984	101,649	8.2	1,488	145,125	6.9
Rose Deep	23	3,970	1.3	D	111	20,100	1.3	125	21,439	5.3
<b>J.C.I.*</b>										
Freddies Cons.	65	12,904	119.9	D	314	65,638	1133.2	289	65,682	1224.4
Govt. G.M.A.	38	7,456	110.3	D	214	44,139	126.1	265	53,997	2.6
Randfontein	18	2,948	0.5	D	85	15,194	3.7	113	21,971	15.5
<b>Union Corporation</b>										
East Geduld	128	36,160	218.2	D	633	180,711	1098.9	666	196,264	1275.6
Geduld Prop.	80	12,920	20.0	D	390	62,696	107.7	364	66,169	124.5
Grootvlei	225	46,532	227.1	D	1,077	222,944	1088.2	1,070	223,114	1138.7
Marievale	102	24,378	123.0	D	488	117,929	603.8	492	120,481	623.8
St. Helena	194	67,907	437.6	D	904	317,317	2032.0	785	263,846	1620.4
Van Dyk	78	12,468	9.4	D	367	58,480	35.0	360	60,957	52.1
Winkelhaak	99	33,660	179.2	D	471	160,369	865.1	410	126,852	563.2
<b>General Mining</b>										
Buffelsfontein	150	65,953	380.0	J	1,629	688,396	3859.0	1,578	612,550	3207.7
Ellaton	24	5,620	13.5	D	124	28,887	80.4	142	32,620	126.0
S. Roodepoort	31	7,487	24.1	J	326	78,693	249.3	328	78,340	249.8
Stilfontein	179	80,550	428.8	D	873	395,456	2136.9	783	352,480	1827.6
W. Rand Cons.	139	20,845	22.0	D	663	98,429	79.3	647	92,821	27.7
<b>Anglo Transvaal</b>										
Hartebeestfontein	136	62,563	361.6	J	1,386	642,588	3679.9	1,117	548,745	3287.5
Lorraine	85	24,012	15.2	S	659	162,992	133.8	620	129,077	1162.8
Rand Leases	199	26,566	15.3	J	2,082	290,957	16.4	2,036	305,043	252.2
Village M.R.	37	3,935	12.8	J	348	45,822	132.6	335	51,342	7.7
Virginia O.F.S.	138	27,358	166.5	J	1,376	288,206	1397.1	1,459	328,311	145.0
<b>Others</b>										
N. Kleinfontein	75	10,380	2.5	D	366	50,463	15.2	392	50,965	6.2
Wit Nigel	20	4,274	3.4	J	219	47,928	52.5	207	48,040	57.9

Gold has been valued at 250s. 6d. (April 250s. 6.1.) per oz. fine. L indicates loss. † Working Profit. Tables exclude profits from Uranium, Pyrite and Acid, and also production from Uranium divisions at Randfontein and W. Rand Consolidated.

### ESTIMATED URANIUM REVENUE

Company	Year ends	May Profit (£000)	This year (cum.) (£000)	Last year (cum.) (£000)	Company	Year ends	May Profit (£000)	This year (cum.) (£000)	Last year (cum.) (£000)
<b>Goldfields</b>					<b>J.C.I.</b>				
Doornfontein	J	16.0	164.5	164.0	E. Champ d'Or (a)	D	4.5*	24.5*	35.2*
Luipaards Vlei (a)	J	125.0	1143.2	1084.7	Freddies Cons. (b)	D	132.5*	162.0*	150.0*
Vogels	D	56.0	274.5	274.0	Govt. G.M.A. (c)	D	19.0*	105.0*	115.2*
West Drie	J	51.5	545.0	548.0	Randfontein (b)(c)	D	139.9*	692.7*	548.1*
<b>Anglo American</b>					<b>General Mining</b>				
Daggasfontein (b)	D	125.0	643.0	707.1	Buffelsfontein (d)	J	135.0	2059.5	2324.0
P. Brand (b)	S	44.8	354.9	374.3	Ellaton (d)	D	2.2†	9.4	88.0
P. Steyn (b)	S	61.5	490.1	491.6	Stilfontein (d)	D	6.5†	109.5	449.0
Vaal Reefs (b)	D	73.0	364.9	718.8	W. R. Cons (c)(d)	D	156.0	843.0	1045.0
Welkom (b)	S	58.2	466.6	469.2	<b>Anglo Transvaal</b>				
West Reefs Ex. (b)	D	49.0	246.6	815.6	Hartebeestfontein (d)	J	204.5	2563.0	2874.6
<b>Central Mining</b>					Lorraine (d)	S	34.0	271.0	283.0
Blyvoor (b)	J	165.0	1733.5	1686.2	Virginia O.F.S. (d)	J	154.2	1841.9	1948.6
Harmony (b)	J	200.7	2488.0	2271.6					

Tables include profit from uranium acid and pyrite before loan redemption. (a) Including profit from gold section. (b) Includes royalty provision. (c) Total profit from uranium section. (d) Excludes royalty provision. \* Net revenue. † Uranium royalty received.



# THE CENTRAL MINING — RAND MINES GROUP

Extracts from Chairmen's Statements circulated to Shareholders

(Reports of the proceedings will be made available on request to the London Secretaries—A. Moir & Co., Ltd., 4 London Wall Buildings, London, E.C.2.)

## CITY DEEP, LIMITED

(Incorporated in the Republic of South Africa)

The Sixtieth Ordinary General Meeting of shareholders was held in Johannesburg on June 15, 1961.

The following is an extract from the circulated Statement by the Chairman, **Mr. P. H. Anderson**, dated June 1, 1961.

In the Directors' Report it is stated that capital expenditure during the current financial year is estimated at approximately R200,000. As a result of a decision taken after the Director's Report was prepared, to re-open and equip 45 Haulage, this estimate should now be increased to approximately R300,000.

In the K1 area below the dyke the development footage sampled on Main Reef Leader during the year totalled 1,340 feet. From the start of development in this area, the total footage sampled on Main Reef Leader up to the end of April, 1961, was 3,390 feet averaging 17.5 dwt. over a channel width of 20 inches, or 349 inch-dwt. In the K4 Shaft area, further east and above the dyke but also in the deep levels of the mine, the footage sampled during the year totalled 450 feet of an average value of 17.1 dwt. over a channel width of 18 inches, equal to 308 inch-dwt.

As the longwall system of mining is or will be in use in these areas, it is important to note that the values given above for the K1 and K4 Shaft areas relate to all the footage sampled and not only to the payable footage.

It can be said that the good values now being encountered in the deeper levels indicate a better "ore in sight" position than has been the case for many years and it is hoped that future work will give the mine greater flexibility by removing the shortage of stope faces which has adversely affected operations in past years.

At the end of the year the ore reserves below the Vierfontein dyke were much greater than at the end of the previous year but in total the ore reserves decreased by 310,000 tons to 3,151,000 tons; this position is accounted for partly by a reduced development footage on reef and partly by the increased rate of mining. At 5.8 dwt. per ton, the average value of the available reserve increased by 0.1 dwt., the width being 0.5 inch less.

Now that the main zone of stoping operations has moved below 45 Haulage elevation, work has started on the re-opening and equipping of this Haulage in order to provide a common working level between the various shaft banks. Once this is accomplished it should be possible to close down several of the upper Incline Shafts between 32 and 45 levels and so reduce hoisting costs.

The Company has adequate funds to meet the overall expenditure now contemplated for the mine.

## CROWN MINES, LIMITED

(Incorporated in the Republic of South Africa)

The Sixty-fifth Ordinary General Meeting of shareholders was held in Johannesburg on June 15, 1961.

The following is an extract from the circulated Statement by the Chairman, **Mr. P. H. Anderson**, dated June 1, 1961.

The footage developed during the year at 45,737 feet was 10,321 feet more than that of the previous year, and the footage sampled increased from 19,745 feet in 1959 to 27,720 feet during the year under review. Sampling results revealed a slight improvement in payability and values. The payable ore developed during the year increased by 99,700 tons to 421,000 tons but despite a transfer of 425,600 tons of ore from shaft and safety pillars, the available ore reserve decreased by 435,000 tons to 2,401,000 tons. As a result of the continued decline in the available ore reserve, a further planned reduction in the scale of operations has become necessary and this arrangement is already being put into effect.

Underground production of ore is predominantly from the lower western section of the mine together with the removal of shaft pillars at Nos. 7, 12, 14 and 16 Shafts, while development operations are largely confined to the testing of isolated small areas, together with the important exploration of the area to the south of the Vierfontein Dyke. In this latter case, development on the Main Reef Leader body is being carried out from both S5 and S3 Sub-incline Shafts with modest results which nevertheless offer some promise.

In the same connection R2 Sub-incline Shaft at the eastern side of the mine was de-watered and re-equipped to within 90 feet of the shaft bottom during the year. Sinking of this shaft was re-commenced on April 21, 1961, with the object of providing another point of attack in the exploratory work south of the Vierfontein Dyke.

It will be appreciated that the future prospects of the mine depend largely on the degree of success which is attained by these development operations south of the Vierfontein Dyke.

During the year under review, the Company's principal property transactions were the sale of five lots, totalling approximately 16.5 morgen, in Aeroton Township for R65,300 and the sale of about 16.4 morgen of freehold of the farm Vierfontein in the extreme south western portion of the Company's property for R24,572. Expenditure on property account, including R33,326 spent on Aeroton Township, less other credits, amounted to R31,082.

On May 23, 1961, the Board issued to all registered shareholders a circular dealing with criticisms by two shareholders of some of this Company's past property transactions. I will refer to this

matter at the annual meeting and, for the benefit of the many shareholders who are unable to attend, a report of the proceedings will be sent to all registered shareholders.

## DURBAN ROODEPOORT DEEP, LIMITED

(Incorporated in the Republic of South Africa)

The Sixty-fourth Ordinary General Meeting of shareholders will be held in Johannesburg on June 16, 1961.

The following is an extract from the circulated Statement by the Chairman, **Mr. T. Reekie**, dated June 1, 1961.

In the Lease Area to the south-west of the property, 9,891 feet were developed during the year under review, compared with 9,023 feet in 1959. There was a substantial increase in the work done on Kimberley Reef, and of the 1,377 feet developed, 1,270 feet were sampled, giving 41.7 per cent payability at 7.2 dwt. over 20 inches compared with 39.3 per cent payability at 4.2 dwt. over 33 inches in the previous year. Of the 5,479 feet developed on the Main Reef, 4,290 feet were sampled, of which 31.9 per cent was payable at 10.3 dwt. over 39 inches. Although the payability fell off slightly compared with the 1959 figure, the value increased by 1.5 dwt. and the width was reduced by 2 inches, to give 401 inch-dwt. compared with 362 inch-dwt. The remaining 3,035 feet of development were off reef. Since the commencement of operations in the Lease Area in 1956, a total of 30,684 feet has been developed, 18,070 feet have been sampled, and 6,570 feet or 36.4 per cent have been payable with an average value of 349 inch-dwt. over a channel width of 42 inches.

In general it may be said that the progress of development in the mine has been satisfactory.

Satisfactory progress has been made with the expansion of the capacity of the Roodepoort United Plant to 204,000 tons per month so that it will be possible to centralize the milling of the mine's entire output at that plant, thereby in due course enabling the old "Deep" Mill, which at present deals with approximately one-fifth of the output, to be closed down.

The initial estimate of the cost of this conversion, based on a schematic layout, was R1,060,000 spread over two years. Due firstly to the need to keep both plants in full operation, and secondly to the desirability of installing additional equipment as the work proceeded in order to take full advantage of the possibilities inherent in this scheme and of the most up-to-date development, the present revised estimates show an increase in the original cost of R396,500 to a total of R1,456,500, which will be spread over a slightly longer period than the two years originally envisaged.

The extensions at the Roodepoort United Plant should be completed by the middle of 1962.

On January 20, 1961, the Company achieved the distinction of being awarded the Industry's "Millionaire Shield" upon the completion of 1,000,000 consecutive underground shifts free of fatal accidents, an achievement which reflects great credit on the mine management, staff and employees.

## EAST RAND PROPRIETARY MINES, LIMITED

(Incorporated in the  
Republic of South Africa)

The Sixty-fifth Ordinary General Meeting of shareholders was held in Johannesburg on June 15, 1961.

The following is an extract from the circulated Statement by the Chairman, Mr. P. H. Anderson, dated June 1, 1961.

The tonnage milled during the year increased by 37,000 tons to 2,662,000 tons, in spite of an increase in the amount of waste sorted. Unfortunately, the yield per ton at 4.824 dwt. was substantially lower owing to an unexpected falling off of value in the Central Section of the mine. In spite of a decrease of nearly R160,000 in working expenditure during the year, the working profit at R1,957,920 was lower by R833,892. The decrease in unit working costs, amounting to 13 cents per ton milled, halted a succession of increases since devaluation over a decade ago. The reduction in unit costs in the face of increase depth is due largely to energetic steps taken by the mine management to control expenditure.

Due mainly to the interest payable on loans and loan facilities granted, amounting to R89,474, sundry items of expenditure exceeded sundry revenue by R5,882 and reduced the profit to R1,952,038. This amount, together with the unappropriated balance of R1,219,508 brought forward from the previous year and a small credit in respect of taxation, gave a total of R3,172,892, from which was appropriated R1,500,000 to Capital Reserve and R1,287,000 for dividends. This left an unappropriated balance of R385,892 at December 31, 1960.

The capital expenditure of R3,310,506 made further heavy demands on the Company's cash resources. However, with the recent completion of the new Central reduction works, the rate of capital expenditure will now return to a more modest level. The new plant cost approximately R5,200,000 compared with the estimate of R4,800,000 made early in 1958 and accounted for about 65 per cent of the capital expenditure incurred during the period of its erection. The necessary finance has been found from unappropriated and current profits with the assistance of loans.

The yield per ton milled during 1960 at 4.824 dwt. was the lowest since 1954, while the average during the first four months of the current year has been under 4.5 dwt. per ton milled. As a consequence, the profit level has been seriously affected. This decline in yield is due mainly to a falling off in value on longwall stopes in the Central Section and to absorption at the new reduction plant. Where possible the poorer grade stope faces have been stopped and the operations switched to areas of more

promise. Although there are at present some indications of an improvement, it is yet too early to forecast the effects of this switch as it will be some months before the new faces are in full production. During the year there was a falling off in payability of exploration at depth which was in the main accounted for by poor results in the Central Section where the G and H pilot winzes now appear to have passed out of the main zone of good values stretching across the deep levels of the property. On both the eastern and western sections of the property, however, recent development at depth is giving some encouraging results.

Test-running of the Central reduction plant has now been completed and the plant is operating efficiently and to a capacity of approximately 190,000 tons a month. I am pleased to be able to state that there is every indication that the estimated substantial saving in costs will be fully achieved when all operations are concentrated in this modern reduction plant.

The Angelo plant has been closed down after fifty-four year's service. At the Cason plant, which also commenced production in 1906, only a portion of the reduction works remains in operation and a small plant is being erected for clean-up purposes. Clean-up is proceeding at both plants, and it is intended to make a special declaration at the end of this month in respect of gold already recovered from clean-up operations.

## MERRIESPRUIT (ORANGE FREE STATE) GOLD MINING COMPANY LIMITED

(Incorporated in the  
Republic of South Africa)

The Twelfth Ordinary General Meeting of stockholders will be held in Johannesburg on June 16, 1961.

The following is an extract from the circulated Statement by the Chairman, Mr. P. H. Anderson, dated June 2, 1961.

A provisional tributing agreement was entered into by your Company and the Virginia Company on January 23, 1961, whereby the Virginia Company will have the right to mine in an area equal to approximately 322 claims of this company's mining title until June 30, 1966. The area is estimated to contain at least 800,000 tons of ore which it is expected will be mined by the Virginia Company during this five-year period. The agreement provides, *inter alia*, that Virginia will reimburse this Company in respect of the cost of all work done in the area since June, 1959, that one-half of the net profit from gold mining in the area will accrue to this Company and that 13.673 per cent of the sum of the uranium royalties received by Virginia from Hartebeestfontein Gold Mining Company Limited plus a similar percentage of the working profit from Virginia's own uranium production will be payable to this Company. The Company will relinquish its part-ownership of the Virginia uranium plant and will no longer be liable to contribute to the amortization of that plant, and on termination of the agreement if this Company has decided to continue mining operations in the area it will reimburse Virginia for the cost development in respect of ore remaining unmined together with the agreed value of permanent installations left in the area.

These arrangements have been approved by The Hon. The Minister of Mines.

In respect of the uranium quota of 1,334 tons ceded by Virginia to Hartebeestfontein the royalty is R4.90 per lb. and Virginia's contract price for its quota of 736 tons is R7.918 per lb. It is expected that the uranium content of ore mined and milled from this Company's property will be entirely absorbed in producing its proportion of Virginia's quota of 736 tons.

The tributing arrangements will not only be of benefit to this Company financially but will also place it in a better position to assess the possibility of reopening the mine as an independent producer should there be an increase in the price of gold. It should, of course be borne in mind that even if circumstances did warrant the reopening of the mine considerable additional capital funds would be required to dewater the flooded workings and to bring the mine to production.

At No. 2 Shaft the water level was 1,712 ft. below the collar of the shaft on April 30, 1961.

It will be seen from the Balance Sheet that the Company's cash resources were almost exhausted at December 31, 1960. Subsequent to the close of the financial year is was therefore necessary to arrange for finance to meet current cash requirements and temporary loan facilities of up to R100,000 have accordingly been secured from Virginia-Merriespruit Investments (Proprietary) Limited at 6½ per cent per annum. An amount of R15,000 has been drawn against these facilities to date.

In the light of the Company's financial and mining prospects under present conditions it is clear that the estimated revenue will fall very far short of the prior claims of the outstanding uranium loans and debenture and loan creditors, which together total approximately R16,900,000. There is no respect of dewatering the mine under present conditions and therefore after allowing for such appropriations for capital expenditure as the Directors may deem advisable and loan repayments (excluding repayments in respect of debenture and loan stocks), it is considered appropriate that the remaining distributable revenue should be applied in reduction of the Company's debenture and loan stock indebtedness.

Surface installations are intact and are being maintained, but due allowance must be made for depreciation and obsolescence.

In previous years the notes to the Balance Sheet have contained a statement that the Company had disposed of its mine housing to Virginia Land and Estate Company Limited for the sum of R3,400,000, of which R2,400,000 had been paid to the Company and that the balance of R1,000,000 would be payable, in pursuance of Clause 4 of the relative Deed of Sale, to the Company when it recommences normal mining operations and milling for the production of gold, provided, however, that if the Consulting Engineer of Anglo-Transvaal Consolidated Investment Company, Limited certifies that the Company has abandoned its attempts to dewater the mine and to recommence milling for the production of gold, then the additional amount of R1,000,000 would not be payable by the Virginia Land and Estate Company. Since the close of the financial year the Consulting Engineer of the previous Technical Advisers certified that the dewater-



ing operations contemplated in the relative deed of sale had been abandoned, and the Board has accordingly agreed that the Company's right to the payment of the balance of R1,000,000 has now fallen away. No further payment will, therefore, be received. The Company, however, has retained the right for five years to repurchase at cost, less depreciation, any houses that are available which it may require. For the information of stockholders, the original cost to this Company of the 432 houses and a small block of flats sold to Virginia Land and Estate Company Limited, was R2,937,786.

## TRANSVAAL CONSOLIDATED LAND AND EXPLORATION COMPANY, LIMITED

(Incorporated in the  
Republic of South Africa)

The Sixty-sixth Ordinary General Meeting of shareholders will be held in Johannesburg on June 16, 1961.

The following is an extract from the circulated Statement by the Chairman, Mr. T. Reekie, dated June 2, 1961.

The profit before taxation amounted to R843,076, which was R123,270 higher than the figure for 1959. After deducting an amount of R192,900 provided for taxation the balance of Income and Expenditure Account brought forward from the previous year increased by R650,176 to R1,675,890. Against this figure, appropriations were made for dividends declared of 22.5 cents and 23 cents per share, respectively, totalling R423,258, and for a transfer of R300,000 to General Reserve. The balance of the Income and Expenditure Account was accordingly R952,632 at December 31, 1960, compared with R1,025,714 at the end of 1959. The net current assets of the Company, excluding its subsidiary companies, increased by R105,480 to R805,936.

Despatches increased by 94,830 tons to 678,985 tons, which resulted in an increased working profit of R425,479 compared with the figure of R331,780 for the previous year.

There was an improvement in the trade during the year mainly due to increased local sales and a freer supply of railway trucks. Some of the additional demand was due to the partial closing, in January, 1960, of the Coalbrook Colliery which resulted in other Collieries being called upon to supply coal to certain power stations in the Orange Free State; this trade will diminish, however, as the Coalbrook South Colliery builds up its scale of operations to provide the tonnage formerly supplied by Coalbrook North.

Although there was a satisfactory level of production and sales of chrome ore by Winterveld (T.C.L.) Chrome Mines (Proprietary) Limited, the average market price was lower. The Rooderand Chrome Mine was placed on a caretaking basis during the year owing to chrome market conditions generally and to a decline in the average price obtainable for the grade of ore produced.

Royalties from those of the Company's mineral properties which are let on tribute for the mining principally of asbestos, chrome and tin totalled R286,639 compared with R277,896 in the previous year. Further mineral right holdings of the Company were geologically examined and the expenditure on

exploration and ventures totalled R21,518 for the year.

The book value of the Company's portfolio of quoted holdings increased during 1960 by a net amount of R161,782 to R2,079,334. Investments were extended during the year by the acquisition of holdings in Bracken Mines, Limited, Leslie Gold Mines Limited and Witbank Colliery, Limited, and increases were made in certain existing shareholdings. At December 31, 1960, quoted investments had a market value of R3,396,674 which was R237,824 lower than the market value of the quoted portion of the portfolio at the end of 1959. This decrease in market value conformed generally with the overall decline in the Stock Exchange value of South African securities resulting from the prevailing uncertainties.

The amount provided for depreciation of investments, including unquoted shares and shares in subsidiary companies, was R89,912 from which was deducted a profit of R2,444 on the disposal of certain holdings.

The Company's principal investment interests are listed in the Annual Report. Quoted investments, based on market values at December 31, 1960, are held as to—gold mining companies, 87 per cent; investment companies, 7 per cent; industrial companies, 4 per cent; coal mining companies, 2 per cent. During 1960, dividends accrued from investments totalled R265,335 compared with R216,512 during the previous year.

## BRITISH BORNEO PETROLEUM SYNDICATE LIMITED

The forty-seventh Annual General Meeting of British-Borneo Petroleum Syndicate Ltd., was held on June 7 in London, Mr. Campbell L. Nelson, the Chairman presiding.

In the course of his speech, the Chairman said:

Our quoted investments had a Stock Exchange value at the end of the financial year of £2,382,000. This gives a gratifying surplus over the book value. It is necessary, however, to keep in mind that your Company is a finance company and profits and losses on the sale or change of investments have to be brought into account for taxation purposes.

Royalty interests consist of the right to receive a royalty of 1/- per ton on all oil production of Brunei Shell Petroleum Company, in the State of Brunei, and a royalty of 6d. per ton on any oil production which may be obtained in the Klias Peninsula in North Borneo.

Turning to the Profit & Loss Account, the royalty from Brunei oil production is £216,000 compared with £257,000 in the previous year. Dividends and interest at £129,000 show an increase of £25,000 over the previous year. Profit on realization of investments, etc., at £71,000 show an increase of £31,000. Total revenue at £416,000 is a record for the Company.

The net profit for the year is £213,000. We have appropriated £5,000 to Investment Reserve and £70,000 to General Reserve. The interim dividend of 6d. free of Income Tax per stock unit paid in December last and the final dividend of 1s. 4d. free of Income Tax which we now recommend take £137,000.

Unappropriated profits carried forward are £75,000.

We had last year holdings which were the subject of take-over bids, the main one being shares in Canadian Eagle Oil Co. We have the same position arising in the year under review because of the take-over of Apex (Trinidad) Oilfields Limited by British Petroleum Company. The Stock Exchange value of the British Petroleum shares which we received in exchange for our Apex shares showed a surplus of £212,000. No part of that surplus has been taken to Profit & Loss Account. The British Petroleum shares are retained in our books at the same figure as our holding of Apex shares. Unfortunately we have to pay tax on such transactions and on this occasion the bill was £109,000 which we have charged directly to General Reserve. The cash element of 4/6d. per Apex Share has been carried to Profit & Loss Account. We have also taken to Profit & Loss Account as a charge, the taxation that arises on this cash element.

Over half of our revenue came from the Brunei royalty. The Brunei Shell Petroleum Company continues its active production programme in the Seria Field. The oil is well placed geographically for the Far Eastern markets and reserves are substantial. Although we must expect this revenue to continue to decline over the years, we can look to have a substantial income from this source for many years to come.

Reverting now to our quoted investments the following is an analysis based on the Stock Exchange values at the date of our Balance Sheet. Oil Companies 61%, Mining Finance and Mining Companies 23½%, Home Industrials 15½%. Included in these categories are South African and Rhodesian securities 15½% and American and Canadian securities 9%.

The year has been a satisfactory one. Revenue and net profit are records for the Company. We look forward to increasing revenues from our investments. At the same time we are faced with a declining royalty. This underlines the importance of our policy of investing a substantial part of each year's profit thereby augmenting the growth in revenue from our investments.

## MINING ENGINEERS

Applications are invited from young men who hold Honours Degrees in Mining Engineering for interesting work, on short term contracts, in well-known Company's West African subsidiary.

Salary £1,500 per contract.

Conditions of service include a generous bonus scheme; free accommodation; free medical attention; and 10 weeks' paid leave after a tour of duty lasting 10 months.

Overseas kit allowance of £60.

A Gratuity of £250 will be paid on termination of contract.

First-class return passages will be paid by the Company.

Applications in writing, stating qualifications, experience, age and marital status, should be addressed to:—

Box No. 440, Dorland (City) Ltd.,  
1, Royal Exchange Avenue,  
London, E.C.3.



## MINING FINANCE—Continued

equal an annual net earnings rate of virtually 100 per cent or 10s. a share, but a substantial proportion of the net surplus is having to be retained for capital expenditure which remains heavy at this expanding mine.

Of the other Consolidated Gold Fields group companies, Libanon has been achieving small but useful increases in its payments over the past two years, but there is a further reduction on this occasion in the Doornfontein distribution. This should not, however, have come as a surprise. The chairman forecast some reduction last November. Capital expenditure was one reason but the impact of tax ranks as the main influence. The first payments in this respect started at the beginning of the current financial year to June 30.

The Anglo American group declarations contained little more than the satisfaction of being much as expected with the 3d. rise in the Vaal Reefs interim to 1s. 9d. of most note in view of

this mine's pending first tax liability in the current year. The chairman said in April that this should have no adverse effect on dividends. The Anglo-Transvaal announcements were notable for the absence of any interim from Middle Witwatersrand (Western Areas) Ltd. which came as a shock to the market despite the chairman's recent warning about reduced payments.

## EAST RAND'S PROSPECTS

Of the Central Mining payments the fresh cut in the East Rand Proprietary dividend to only 1s. against 1s. 9d. at this time last year made most impact and also brought about eager perusal of the statement by the chairman, Mr. P. H. Anderson, for any signs of an improvement in this old Central Rand mine's affairs. There are indeed some, such as the prospect of the heavy capital expenditure burden being reduced to a more modest level, but it is still too early to say whether plans to improve the mill

grade will be effective. The new Central reduction plant is operating efficiently and the estimated substantial saving in costs is likely to be fully achieved when all the operations are concentrated there, Mr. Anderson said. All in all, it looks as though the present dividend setback should be the worst to be expected.

## CITY DEEP'S IMPROVED RESERVE POSITION

Of the other companies in the Central Mining group whose chairmen's annual statements have now been published, there is some encouragement for City Deep where the good values being encountered in the deeper levels indicate a better ore-in-sight position than for many years past. So it is hoped that future work will give this old Central Rand mine greater flexibility by removing the shortage of stope faces which has adversely affected operations in recent times. Estimated capital expenditure for 1961 has now been increased to about £150,000, but the company has adequate funds to meet such expenditure, the chairman says. This is, of course, without taking into account the capital accretion that will result if the long-delayed property deal with the Johannesburg City Council should eventually go through. In the annual report it was stated that a final decision on this matter is expected before the end of the year.

## HIGHER GOLD PRICE ONLY HOPE FOR MERRIES

Under the new deal with the Virginia and Harmony mines Merriespruit is now under the technical control of the Central Mining group. But this does not alter the stark fact, as the chairman says, that any estimated revenue for this flooded O.F.S. mine must fall "far short" of creditors' claims that now total some £8,450,000. But the inter-mine arrangement will at least put the Co. in a better position, should any gold price rise come about, to assess the possibility of re-opening the mine as an independent producer. Any positive decision would naturally mean the sinking of a further large amount of capital in the property.

## £30,000 P.A. IN KATANGA

In the annual statement of the chairman of General Mining (page 708), more information has been given about the prospecting concessions that General Mining now hold in the Katanga area adjoining the Northern Rhodesian Copperbelt. The new prospecting company, which is in course of registration in Katanga, will be obliged, after the first six months, to spend at least £30,000 per year on exploration.

The Katanga government will be entitled to participate substantially in any mining companies which may be formed to exploit the minerals in the area. Anglo American will also participate with General Mining in this venture.

## PROSPECTING IN THE CANADIAN ARCTIC

In his address to shareholders of Ventures Ltd., Mr. H. J. Fraser, has outlined the many problems associated

(Continued on page 711)

	Dec. 1959 s. d.	June 1960 s. d.	Dec. 1960 s. d.	June 1961 s. d.
<b>Anglo American Corporation</b>				
Brakpan .. .. .	6*	4½*	6*	6*
Daggafontein .. .. .	2 3	2 0	2 0	2 0
East Daggafontein .. .. .	7½	7½	9	9
South African Land Springs .. .. .	6*	—	6*	—
Vaal Reefs .. .. .	2 0	1 6	2 0	1 9
Western Reefs .. .. .	1 3	1 3	1 3	1 3
<b>Anglo-Transvaal</b>				
Consolidated Murchison .. .. .	5 6	3 6	4 3	3 0
Hartebeestfontein .. .. .	3 0	3 0	2 6	2 6
Middle Wit. .. .. .	7½	7½	7½	—
New Klerksdorp .. .. .	1 0	1 3	1 6	3 6
Rand Leases .. .. .	1 0*	6*	6*	6*
<b>Central Mining - Rand Mines</b>				
Blyvooruitzicht .. .. .	1 2	1 3	1 3-6	1 3-6
City Deep .. .. .	7½	7½	8-4	8-4
Cons. Main Reef .. .. .	1 3	1 6	1 6	1 6
Crown Mines .. .. .	2 0	2 0	2 0	2 0
Durban Deep .. .. .	1 6	1 6	1 6	1 6
East Rand Proprietary .. .. .	1 9	1 9	1 6	1 0
Modder B. .. .. .	6	—	6	—
Modder East .. .. .	6	6	6	6
Rand Mines .. .. .	3 0	3 0	3 0	2 6
Rose Deep .. .. .	—	3 3*	1 0	—
Transvaal Cons. Land	2 3	2 3	2 3-6	2 3-6
Welgedacht .. .. .	—	3	4-8	4-8
<b>Consolidated Gold Fields</b>				
Dominion Reefs .. .. .	1 6	1 6	1 3	1 6
Doornfontein .. .. .	1 6	1 6	1 4-8	1 3-6
Libanon .. .. .	3½	4½	4-8	6
Luipaards Vlei .. .. .	1 0	1 0	1 0	1 0
Rietfontein Cons. .. .. .	8*	6*	7-2*	2-4*
Robinson Deep .. .. .	—	—	—	3*
Sub Nigel .. .. .	1 3*	1 3*	1 3*	1 3*
Venterspost .. .. .	10½	1 0	1 0	1 0
Vlakfontein .. .. .	1 0	11	1 1-2	1 0
Vogelstruisbult .. .. .	10*	8*	8-4*	6*
West Driefontein .. .. .	4 9†	2 7½	2 10-8	3 1-2
West Wit. Areas .. .. .	1 10½	1 10½	2 0	2 0
<b>General Mining</b>				
Buffelsfontein .. .. .	1 9	1 10½	1 9	1 9
Eastern Rand Ext. .. .. .	1 0	9	1 0	9
New Pioneer .. .. .	1 3	1 9	1 3	1 9
South Roodepoort .. .. .	1 1½	1 1½	1 1½	1 1½
Stilfontein .. .. .	1 7½	1 6	1 6	1 6
West Rand Cons. .. .. .	2 3	2 0	2 3	1 9
<b>Johannesburg Consolidated</b>				
East Champ d'Or .. .. .	3	3	3	2-4
Government Areas .. .. .	6*	6*	3*	4½*
Randfontein .. .. .	2 3	1 3	1 9	1 9
<b>Union Corporation</b>				
East Geduld .. .. .	1 11	1 8	1 9-6	1 6
Geduld .. .. .	5 0	3 4	3 7-2	3 0
Grootvlei .. .. .	1 5	1 1	1 4-8	1 1-2
Mari-vale .. .. .	1 7	1 6	1 10-8	1 6
Van Dyk .. .. .	—	1 6*	—	9*

\* Capital repayment.

† Before 100% share bonus

Chairman's Statement: ANGLO AMERICAN CORPORATION OF SOUTH AFRICA LIMITED  
Incorporated in the Republic of South Africa

# Urgent Need of Republic is to Restore Overseas Confidence

## GRAVE RACIAL PROBLEMS INSURMOUNTABLE UNLESS LIVING STANDARDS RISE

### Mr. H. F. Oppenheimer Discusses the Challenge to South Africa

*The following is from the statement by the chairman, Mr. H. F. Oppenheimer, which has been circulated to members:*

The accounts of the Corporation reflect at once a successful year's operations and the anxieties of investors about the future. The continued expansion of the major industries in which we are interested brought about a very important rise in our investment income, which, at £8,159,327, exceeded the previous year's figure of £7,053,463 by no less than 15.7 per cent. As a result of political factors, however, the market value of our quoted holdings fell by 23 per cent during the year, from £129,938,543 to £99,828,153. Largely in consequence of this, the opportunities for the favourable realization of shareholdings were very few, and it was necessary to write down many investments. The result was that, while in 1959 there was a net profit of £413,600 from realization of investments after providing for all amounts written off, in 1960, by contrast, profits from realization of investments were less by £1,189,612 than the amount required for writing down purposes. This marked reverse in an important part of our operations — an adverse swing of £1,603,212—more than offset the increase in our dividend income. However, a consequential decrease in the amount required for taxation, together with increased revenue from certain other sources, resulted in the net consolidated profit, at £7,844,000, being greater by £113,000 than the previous year's figure. In the difficult circumstances, this must, I think, be regarded as a very satisfactory result.

#### Withdrawal of Capital

The severe fall in share prices to which I have referred was caused, in the main, by heavy selling of South African shares by investors outside the country. In total, the net withdrawal of foreign capital during 1960 was about £80 million. Since the end of the year this trend has continued.

A capital inflow on a fairly large scale is essential if we are to realize the country's full economic potential. The falling-off and, more recently, the reversal of this inflow are already seriously retarding new development and must, if not arrested, threaten the living standards of the people.

The evaporation of overseas confidence in South Africa is a matter of

particular concern to the Anglo American Corporation. The raising of new risk capital from the public for our enterprises has become much more difficult and for the time being we shall have to rely principally on our own resources, supplemented where possible by such sums as may prudently be raised by way of loans. Fortunately, the resources of our group are considerable.

Western Deep Levels Limited is an interesting example. This company of our group is engaged in the largest individual gold mining project ever undertaken in South Africa. In spite of the fact that development results from the property have been entirely satisfactory, and its future prospects are generally regarded as excellent, there was plainly no possibility of raising large sums from the public shareholders. Nevertheless, an offer of shares to raise £8.4 million was made to shareholders and underwritten by the Anglo American Corporation and its associates in the clear knowledge that public support was not to be expected. In the result, including underwriting, approximately £6,610,000 of the issue was subscribed by Anglo American Corporation and companies closely associated with it, and approximately £1,450,000 by other mining groups for whose support we are very grateful. Only some £340,000 of the issue was subscribed by the general public. We are fully satisfied with the long-term prospects of this large investment; but it is worth pointing out that if we had not had sufficient cash resources and the necessary confidence in the future of the mine and of the country to follow the course we have done, there would have been no alternative but to close down this huge project with all its potentialities for the economic development of the country. We shall approach all our new enterprises in the same spirit as we have tackled (and shall continue to tackle) the affairs of Western Deep Levels Limited; but it is obvious that this implies a conservative dividend policy in the group and, possibly, a slower rate of advance than we would have liked to see. There can be little doubt that these factors, making for a more cautious policy in our group, apply with at least equal force to the business community as a whole.

The continued outflow of foreign capital from South Africa with its drain on the country's reserves has now forced the government—which all last year persisted in an expansionist economic policy—to tighten import and currency controls drastically and to take steps to

restrict the supply of credit. It is deplorable that in a country with an economy as basically sound as South Africa's such "war-time" measures should be necessary. It must, however, be agreed that in the situation that had been allowed to develop, these steps were unavoidable and, as interim measures, right. It is quite impossible, however, to find a long-term solution to our problems along these lines. What we are suffering from is not any unreasonable disparity between our exports and imports — indeed, South Africa's current account with the world outside is absolutely sound—but a flight of capital occasioned by a crisis of confidence. Confidence is not restored by strict controls—quite the reverse, in fact—and the best that can be hoped from these measures is that they may give us time, if we are wise, to tackle the social, human and political problems that are the real causes of our difficulties. If these basic matters are not faced up to and confidence restored, we will only be able to protect our external balance of payments at the cost of stagnation in the economic life of the country.

#### Events in the Federation

The economy of the Federation has also been seriously affected by political events, and here, too, the authorities have recently applied strict measures of exchange control. There are, however, important differences between the Federation and South Africa in regard to both the nature of the economic difficulties and the political problems that lie behind them. In these testing times, the economic advantages of the federal structure have shown up to great advantage.

During 1960, the foreign assets of the Bank of Rhodesia and Nyasaland ranged between £33.9 million and £47.9 million, and in the middle of May of this year stood at £41.1 million. These figures are, in the circumstances, impressive, and the currency restrictions which have been applied were presumably intended as a precautionary measure to make sure that, if the stable door had to be bolted, the horse would be on the right side of it. In so far as there has been reason for concern about the Federation's balance of payments, it has arisen not — as in South Africa — from a withdrawal of foreign capital through the Stock Exchange, which in the comparatively undeveloped state of the Rhodesian capital market would not have been possible, but from the apprehension that some Rhodesians

would wish to realize their assets in cash and transfer it abroad on account of their fears about (amongst other factors) the consequences of British policy in Northern Rhodesia.

The racial situation in South Africa and that in the Federation are, of course, in many ways similar, but, as the point I have just mentioned illustrates, there are also basic differences between them. Both countries are deeply influenced by the far-reaching political changes that have taken place further north in Africa.

Obviously, these changes were bound to bring great pressure to bear on South Africa and the Federation to work out liberal solutions to their racial problems; and this the Federation is showing itself willing to do. But, in the Federation, African ambitions have gone much further than that. The federal constitution and that of each of its constituent territories have, in terms of a long-standing agreement, come up for review.

Even in the most favourable circumstances the revision of the constitution of any state is likely to arouse suspicions and antagonisms. In the Federation, the circumstances were far from favourable; and African politicians in Nyasaland and Northern Rhodesia would like to bring Federation to an end in order to be able to develop their countries as purely African states on the model of other Commonwealth territories in West and East Africa. The British Government, which retains ultimate responsibility in Northern Rhodesia and Nyasaland, has appeared to oscillate between, on the one hand, an inclination to meet these African Nationalist aspirations in the same way as it has elsewhere, and on the other hand, a sense of its undertakings to support the development of the Federation as a multi-racial state. This ambiguity in British policy is a serious misfortune. And when it is realized that there is a substantial body of white opinion which reacts to extreme African demands with an intransigent defence of white privilege, it will be obvious that the task of building a united nation on the basis of racial partnership is far from easy. I am convinced that it can be done, and that it is something infinitely well worth doing. Much will depend on whether the moderates on both sides of the colour line who are working for racial co-operation and national unity receive the sympathy and support they deserve.

### The Challenge to South Africa

It is idle to contend that the dislike of South Africa's policies abroad arises merely from misunderstanding. Certainly there is much ignorance and confusion about the nature and the complexity of the country's problems and an unwillingness to give credit for what is being done in South Africa—which is considerable—for the benefit of the non-Europeans. Nevertheless, the fact remains that the South African Government has been at great pains and considerable expense to explain its policies overseas and, recently the Prime Minister himself put his case at the highest level and with conspicuous ability—but without effect. The truth is that the fundamental principle upon which South African policy is at present based is morally unacceptable to practically all the nations of the world, European as well as non-European. No amount of provision of social services for non-Europeans, no amount of development in the native reserves, nor the granting of local self-government or even

full independence in African tribal areas will reconcile the world to a policy under which African, Indian and coloured people, no matter how high their individual capacity or character may be, are denied, on grounds of race and colour alone, rights of citizenship in the country in which they live.

It is regrettable but, in the circumstances of South Africa, scarcely surprising that Africans should look for remedies for their grievances by irregular means such as strikes and boycotts. But such action is extremely dangerous, not only because of its economic consequences but because it undermines law and order and threatens the normal processes through which a civilized state operates. I have no doubt that at present the government is capable of controlling the situation by force. Perhaps it can be held in this way for a long time, but only at the cost of a perpetuation of racial conflict, which must become progressively more embittered. And while this conflict lasts, it will be impossible to restore confidence in the future of the country, and the economy will be threatened with stagnation.

### Race Relations in Industry

The responsibility for improving race relations in the political sphere lies essentially with the government, but some initiative in removing grievances and in fostering goodwill can be taken within industry itself. The relationship between African wages and productivity offers scope for continuing study of how it may be possible to increase wages without adversely affecting the delicately-balanced structure of local industry. While we do not anticipate that the economic circumstances of the gold mining industry, with an unchanging price for its product and an unchecked rise in working costs, will offer scope for dramatic changes, it is our intention to pursue investigations in the hope that, between these harsh millstones, some way can be found of giving adequate increased recognition to higher skills and improving efficiencies amongst our African employees.

There are, moreover, certain fundamental aspects of labour relations which have not received the attention they deserve in their application to our labour forces. At present we house, feed and look after our African employees from medical and social points of view extremely well. Indeed, there are few industries in the world that give the careful attention we do to these subjects. But I feel we can go further. By aptitude testing, training and placement procedures, a reasonable degree of equity and efficiency is achieved today, but if we are to achieve higher levels of productivity, greater attention must be given to the abilities, personal needs, inclinations and aspirations of individual Africans.

### Resources of Goodwill

Viewed against the tremendous problems that face South Africa these aims and what they can achieve may seem relatively unimportant. They affect only a limited number of people and in a limited number of ways. They offer no solution to the major problems that face our country. I hold the view, however, that these major problems depend for their solution, much more than is gene-

rally recognized, first upon the establishment on the personal level of attitudes of respect and affection for people of other races; secondly, on the extension of these attitudes on to the level of industrial and other organizations, and, only thirdly, on political policy.

There are, unfortunately, many pessimists of all races who believe that the differences between our peoples are too great to admit of compromise. But in spite of all the mistakes and missed opportunities of the past, there are undoubtedly great resources of goodwill, and it is still generally accepted that co-operation between black and white is essential for the happiness and security of all South Africans. I believe that, by our policies and our practice, we in the Anglo American Corporation have been able to do something and may be able to do more to foster and sustain inter-racial understanding and sympathy, and to keep open the possibility of a solution to our problems based not on superior force but on compromise and reason.

*Copies of the complete statement are obtainable from the London office of the corporation, 40 Holborn Viaduct, E.C.1.*

## RHODESIA-KATANGA COMPANY, LIMITED

### MR. MICHAEL EASBY'S REVIEW

The Annual General Meeting of Rhodesia-Katanga Company Limited was held on June 8, 1961, at The Chartered Insurance Institute, E.C.2. Mr. Michael Easby, F.C.A. (Chairman), presiding, gave in his Review a history of operations at the Kansanshi Mine up to the present time.

In their report to December 31, 1960, the Consulting Engineers stated that the metallurgical tests for leaching the high grade oxide ore and roasting the sulphide concentrates were completed during the year. An estimate of the capital and working costs relating to the use of this process on the basis of production at the rate of 9,600 long tons of electrolytic copper per year suggests that it would be unattractive under existing conditions.

In the meantime an investigation into the possibilities of new developments in the segregation process has been started. This process is basically one in which the crushed ore is heated with salt and coal in order to reduce the refractory copper values to metal and precipitate the metallic copper on the coal, from which it is readily recovered by conventional flotation process. This process is in commercial use in Arizona, U.S.A., and on a pilot plant basis in Peru and in Mauritania, West Africa. These operations are being studied and the investigation is proceeding in collaboration with the United Kingdom firm of commercial engineering consultants which designed the Peruvian plant.

Mr. Easby concluded that the Kansanshi technical problem was thus the same today as it was thirty years ago—quite simply, how to treat the refractory low-grade ores at a profit. This problem could not defy solution for ever, but the intervening thirty years had brought with them political problems on the successful solution of which would depend all hopes of solid achievement and advance in Central Africa.

The report and accounts were adopted.



## GENERAL MINING AND FINANCE CORPORATION LIMITED

(Incorporated in the Republic of South Africa)

### CHAIRMAN'S SPEECH

In the absence, through illness, of the Chairman Sir George W. Albu, Bt., **Mr. C. S. McLean**, Deputy Chairman, presided at the Annual General Meeting of Shareholders of General Mining and Finance Corporation Limited, held in Johannesburg on June 13, 1961, and said:

In order to avoid the confusion which would result from the mention of two currencies the accounts submitted for approval at this meeting were recorded in pounds, and all figures quoted in this address will be in that currency.

In June last year the state of emergency, declared in March, was still in force and international confidence in this country as a safe and profitable field for investment was low and tending to decline further. The repatriation of cash and loan balances so evident earlier in the year continued at a heavy rate, augmented by further extensive sales of South African securities on foreign account. According to the South African Reserve Bank statistical reports the net outflow of privately held capital funds in 1960 was £97,000,000 or some four times the figure for 1959, whilst the inflow due to external borrowings by the Government, the Reserve Bank and the Commercial Banks was £16,000,000. The net loss of funds on capital account was, therefore, £81,000,000. Notwithstanding the serious implications of this outward movement of funds an appreciable rise in imports was permitted and, with virtually no improvement in the value of merchandise exports, the adverse trade balance was nearly double that of the preceding year. The improvement in gold output equalled the increases in current expenditure other than imports, and consequently the favourable balance of payments on current account declined sharply to £15,000,000. The Union's gold and foreign exchange reserves, therefore, fell during the year by 43% or £66,000,000.

Despite the disturbed financial and political conditions, however, the gold and uranium industry maintained its normal development programme last year. The labour supply was adequate, labour relations were good and new records were achieved in revenue, profits, taxation and dividend payments. The industry played a very important part in sustaining the country's economy in the face of the mounting financial problems. It was, therefore, once again a disappointment that in the recent budget no relief from the existing discriminatory gold mining taxation was granted. Early in 1961 arrangements were concluded by the industry, with the approval of the Government, for the "stretch-out" of uranium production until the end of 1970 with no change in the total quantity to be sold but a slight reduction in the average selling price. Uranium producers have been affected in various ways by these arrangements but in general it may be said that the country, although facing immediate reductions in foreign exchange accruals from this source, will on the other hand be well placed to compete with other world producers in the uranium market in the 1970's.

Notwithstanding the industry's excellent record, the Stock Exchange prices of mining and related financial and holding company shares fell heavily in the first six

months of last year and would probably have fallen even lower but for the steadying influence exerted by certain South African institutions which entered the market as buyers from time to time. As the second half of the year commenced, however, prices became more stable, and in the closing months, with pressure on the dollar and the sharply increasing "free market" price of gold, they rose fairly sharply on rumours of an early increase in the "official" price. These hopes unfortunately turned out to be short-lived and after the close of the year prices subsided once more.

### Grave Decline in Securities

The affairs of this Corporation have been adversely affected by the successive sharp declines over the last eighteen months in the market value of its quoted investments. At December 31, 1958, the total value of this portfolio stood at about £22,000,000. One year later, after additional investments of £1,000,000, the value had risen to more than £30,000,000, but thereafter in the short space of a few months it fell by June 1960 to less than £22,000,000. The general improvement in the last quarter of the year, as I have already mentioned, was not sustained and conditions since then have deteriorated even more sharply than last year, due primarily to mounting uncertainties and fears in the minds of investors both local and overseas because of South Africa's racial policies, her departure from the Commonwealth and developments in other parts of Africa. The value of the portfolio, which by the end of April had fallen to £17,500,000, suffered a further sharp decline thereafter reaching a low point a month ago from which, however, there has been some recovery.

The grave decline in the valuation of South African securities, the present limited market in such securities and the absence of any substantial overseas interest, give point to current fears that the raising of risk capital for the expansion of existing undertakings and the launching of new ventures will become increasingly difficult. Over the past 50 years those responsible for the promotion of mines and industries in this country have always relied to a significant extent, when mobilizing such capital, on the overseas investor both directly as a contributor towards new capital issues and indirectly as a purchaser of shares in established concerns. Foreign capital has in this way played a very important part in the development of our goldfields and industrial areas, but under present conditions this source of funds appears to have fallen away. It is obvious, therefore, that until confidence has been restored risk capital will have to be found to an increasing extent in this country and mining houses and others similarly placed may be obliged to conserve their resources to a degree not found necessary in the past. They may also consider it advisable to defer the expansion of some undertakings and the launching of others until there is a material improvement in financial conditions.

The Corporation's net income for 1960, after provision for all operating expenses and for tax, increased by approximately £50,000 to £1,966,208. There were

improvements in income from dividends and in revenue from other sources against which, however, there was a small decline in the surplus derived from the sale of investments. Total deductions from income were slightly higher, principally owing to increases in interest paid and the provision for taxation, these increases being partially offset by a reduction in expenditure during the year on furniture, equipment and motor vehicles. Of the amount of £281,629 provided for the writing down of certain assets £46,850 was for depreciation of the Holland Street building, £22,294 was in respect of mining and other properties and rights and the balance of £212,485 was applied in reduction of the book value of investments in accordance with the Corporation's established procedures. It was also decided that in view of the substantial fall in the market value of the portfolio during the first four months of 1961, the Investment Reserve should be strengthened by an amount of £350,000 thus raising it to £1,350,000. The net expenditure on exploration last year was £138,545 and this amount was appropriated from the year's profits, together with a further transfer of £100,000 to Exploration Reserve.

The dividends on the Ordinary shares were maintained at a total of 7/- per share and, with the distributions to Preference shareholders, absorbed in all £1,054,578, leaving a balance of £41,456 from the year's profits to be carried forward which increased the balance of unappropriated profits to £535,042.

### Group Interests

The Mines of this group, in keeping with the general industry pattern, recorded good progress last year in their development operations and, with the exception of Ellaton which is nearing the end of its working life, their ore reserves were well maintained both in respect of tonnage and grade. Distributable profits and dividends were also satisfactory in spite of continued heavy capital expenditure at Buffelsfontein and Stilfontein and a marked increase in tax and lease payments by Stilfontein. Since the end of the year all the group uranium producers have concluded negotiations for the "stretch-out" of their production quotas until the end of 1970, and there have been certain re-arrangements of these quotas, whilst additional quotas have been taken over from producers outside the group.

The quotas allocated to the Afrikaner Lease, Babrosco, Ellaton and Stilfontein companies have been taken over by Buffelsfontein, which will consequently produce uranium on approximately the same annual scale as hitherto but over the extended period of 10 years: the total profit it expects to earn from this source under the new arrangements should exceed that which could have been earned under the old contract. The mine is capable of a substantially increased output of uranium without further capital expenditure and therefore, with its very low unit cost of production, will be well placed to participate in any additional sales contracts which may become available in the future. The gold yield per ton has shown a gratifying improvement dur-

ing the current financial year with a resulting rise in profits. Preparations are now being made for the commencement in 1962 of the sinking of twin shafts from surface in the eastern portion of the lease area. The lower levels of the mine will be exploited by means of sub-vertical shafts the first of which, located in the vicinity of the existing Pioneer Shaft System, has almost been completed, and the second will be started on the completion of the eastern twin shafts.

Although Stilfontein has ceased to produce uranium and acid, it will receive royalties over the next ten years from the cession of its uranium production quota, and it is also negotiating with the industry a compensation claim to cover the loss in profits due to the closure of the acid plant. Gold operations continue to be satisfactory, notwithstanding the tendency for working costs to increase, and it is particularly pleasing to note the encouraging improvement in development values which suggest that the mine has passed through the poorer zones which adversely affected its results in 1959.

At South Roodepoort the existence of the Kimberley Reef Horizon on a portion of its mining area has been proved at moderate depth and an agreement has been reached with the owner of certain adjoining ground to explore and mine this horizon on that property. Such limited exposures as have already been made in underground development and boreholes have been encouraging and this work is being continued. Much further development, however, will have to be completed before the potential of this new source of ore can be determined.

For West Rand Consolidated the "stretch-out" arrangements until 1970 for uranium production are of the utmost importance as this mine has large reserves of uranium-bearing ore of high grade which will be available for exploitation after that date to meet any demand then arising at economic prices. In the meantime, notwithstanding the talking over of portion of the quota allocated to the Orange Free State Joint Uranium Production Scheme, output at the mine will be curtailed in 1962 and succeeding years but, despite the substantially lower scale of operations, regular though reduced dividends can be anticipated.

The Corporation's most important holdings in gold mines outside the group are in Free State Geduld and Loraine. In both mines there are very promising areas still to be developed from which large tonnages of high grade ore may reasonably be anticipated. Under prevailing market conditions the shares of these two companies have depreciated considerably, with marked effect on the current value of our portfolio, but nevertheless this has in no way affected our faith in their dividend potential.

About 20% of our portfolio is in shares of financial and holding companies, in and outside this group, with large interests in the gold mining industry. Dividend income from these investments was well maintained last year, but their market values were, of course, adversely affected by the conditions I have described. The future of these concerns will be governed by the same factors as affect the Corporation.

Our industrial interests have not changed materially in recent years and do not represent a significant proportion of our holdings. Dividend income from these sources declined in 1960.

### Establishment of New Industries

During 1959 the Corporation participated with West Rand Consolidated and others in the establishment at the West Rand Mine of a plant to produce electrolytic manganese using the effluent from the uranium plant as a raw material. This concern, Electrolytic Metal Corporation (Proprietary) Limited, came into full production at the end of 1960 and has found a ready and profitable export market for its product which has made excellent headway in the markets of Europe and the United Kingdom. The plant is now being doubled and the increased output should be available for sale in 1962. In view of the diminishing supplies of effluent at West Rand alternative supplies of raw materials have been arranged.

The Corporation has recently concluded an agreement with West Rand Consolidated and others to set up, also at the West Rand Mine, a plant for the manufacture of ferro-chrome. Portion of the mine's redundant equipment will be hired to the operating company, Palmiet Chrome Corporation (Proprietary) Limited, thus saving it considerable time and capital expenditure. There is an expanding world demand for this product.

In participating substantially in these two enterprises the Corporation and West Rand Consolidated were concerned with the need to develop to the maximum extent the processing in this country of ores which even today are being exported in large tonnages with the loss of foreign exchange in respect of the final processing operations.

### Katanga Concessions

In keeping with its policy of searching continuously for new mining areas the Corporation recently concluded an agreement with the Government of Katanga under which it has been granted a concession in that territory over some 8,000 square miles adjoining the Northern Rhodesian Copper Belt. A prospecting company is in course of registration in Katanga which, when all formalities have been completed, will commence a comprehensive examination of the concession area. After an initial period of six months the new company will be obliged to expend on exploration a sum of not less than £30,000 per annum. The Government of Katanga will be entitled to participate substantially in any mining companies formed to exploit payable mineral deposits. The Anglo American Corporation of South Africa Limited will participate with us in this venture.

The commitments facing the Corporation at the present time in respect of the undertakings for which it is primarily responsible are relatively light and it is not anticipated that any heavy obligations will arise in the immediate future in respect of interests held outside the group. It is, however, essential that the Corporation should be able to follow up all favourable investment opportunities which may be offered to it either in respect of existing or new undertakings. Such opportunities are normally lucrative and constitute an important part of the long-term process of building up a well spread and low priced investment portfolio. In view of present market conditions under which it is manifestly impossible to realize substantial blocks of shares on favourable terms, the Corporation has again arranged for the grant of

loan facilities by Anglo American Corporation of South Africa Limited on mutually satisfactory terms. These facilities will remain in force until December 31, 1963, and the Corporation is at liberty to borrow up to £1,500,000. No drawings have so far been made.

### Capital Famine

Since the year end the outflow of funds from this country has continued at an alarming rate leading to successive further sharp declines in the gold and foreign exchange reserves and, consequently, to the recent tightening of import control, restrictions on loan facilities by the commercial banks and the general increase in interest rates. The growing shortage of funds and the increasing concern among investors and the business community generally have contributed to the further decline in share market values. There are many signs of decreasing economic activity, including rising unemployment in some sectors of the economy. Fortunately these factors have not affected the current operations of the gold mines, but they may well exert some influence on the profits and financial resources of industrial and finance companies.

In the circumstances it is difficult to forecast with confidence what the immediate future holds for the Corporation. On present estimates the net income figures for 1961 and 1962 are likely to be somewhat lower than in 1960, largely because of the uranium "stretch-out" arrangements within the group which will lead to reduced dividend income and lower revenue from administration fees. These estimates, however, do not make provision for the possible adoption of conservative dividend policies by any of the companies in which the Corporation is interested. I must also point out that since December 31 last there have been further violent fluctuations in the market values of our investments, certain of which have fallen at times to levels below their individual book values. If there is a return by the end of this year to the low point recorded last month substantial writing down of investments will then be necessary. Against this, however, we have at our disposal the augmented investment reserve.

The serious financial difficulties in which this country is involved have been felt throughout the economy and it is, therefore, natural and proper that those whose interests have been affected should consider the basic causes of the present situation and discuss the possible remedies. It is generally agreed, both here and overseas, that the causes are fundamentally socio-political in origin. The growing loss of confidence, leading to the recent heavy withdrawals of capital, has arisen, it is maintained, largely because of the manner in which the relationships between the white and non-white sections of our population are controlled.

Recently also confidence was severely shaken by the constitutional changes effected against the wishes of a large and well-informed section of the electorate holding a very important stake in our economy. This group has accepted with dismay the severance of our traditional links with the British Crown and considers our departure from the Commonwealth to be nothing short of a disaster. It is not surprising, therefore, that the recent loss of confidence was not confined to investors overseas.



On the other hand this group will be as loyal to the Republic of South Africa as any other and recognizes, and subscribes wholeheartedly to, the urgent need for greater unity and understanding between all races in this country and particularly between the two sections of the white population.

### Co-Existence

The doctrine of "apartheid" and its many applications in South Africa are regarded with growing repugnance throughout the world, even by our closest friends, and the concept that any race, because of its colour, should be subservient to another is no longer tenable.

Events elsewhere in Africa lend greater significance to our problems and have no doubt added appreciably to present difficulties. They do suggest, however, that in our multi-racial state fundamental changes cannot be made rapidly, but must take place over a sufficiently long period to permit of their gradual acceptance. For example, the immediate application of the "one man — one vote" system for all would inevitably lead to economic and political chaos. The solution for the present, therefore, must surely lie somewhere between the extreme points of view, i.e. "apartheid" and universal franchise, and must ensure that, now and in the future, political and economic control will remain in the hands of those, whatever their colour, who are capable of accepting the responsibilities involved.

The non-whites in South Africa are fundamentally patient and law-abiding peoples who have undoubtedly enjoyed much greater educational and material benefits than have been generally available in other parts of Africa. At present they are mainly concerned with improving their educational standards and the economic and other circumstances in which they live. It is, therefore, important that we should work without delay towards the establishment in due course of conditions in which the potential of each individual, whatever his race, can be realized to the full for the benefit of all, and this, of course, can only be achieved in a society in which individual advancement in all spheres of activity depends upon individual merit. This is not possible, for example, when one section of the population enjoys a privileged position in respect of certain avenues of employment or when opportunities for advanced education are denied to the majority of the population. These and other inequalities are to be found in this country and they infringe those fundamental human rights which every law-abiding citizen should be entitled to enjoy and which are the very basis of the civilized standards to which the western world subscribes.

### Multi-Racial Discussions

For months there have been suggestions from all quarters that consultation between the different racial groups has become urgently necessary with a view to seeking a more just and humane approach to our racial problems. There have been recent public statements by both our President and Prime Minister promising greater unity in this country now that the Republic has been achieved. Our leaders should, therefore, make the first move in this direction by creating the opportunity for careful and

co-ordinated discussions with the leaders of all sections. Only by this means can a generally acceptable solution to our problems be found. There is little doubt that such action on their part would be widely welcomed and supported both in South Africa and overseas and would be an important step towards the restoration of confidence.

The Union of South Africa owed its phenomenal development during its short life of fifty years to the leadership and productivity of the white section and to the capital resources that section was able to mobilize, largely from overseas, coupled with the labour and willing co-operation of the non-white peoples. The joint effort of all these groups in our expanding mining and industrial complexes must obviously continue, but on a basis which permits the non-white groups to make an increasing contribution with corresponding improvements in their share of the benefits. I believe that, given enlightened leadership, this can be achieved and in that event the future prosperity of South Africa will be assured.

The establishment of a Republic in South Africa should present no obstacle to the solution of the problems which I have outlined for I am confident that those who have with pride and loyalty served this country's interests during the fifty years of Union will continue to do so under the Republic. I would go further and express the hope that under the régime now established the Government for its part will set this country on the path of international rehabilitation by initiating, on a truly national basis, a system of consultation and discussion such as I have advocated.

It may seem unusual for the Chairman of a financial company to dwell for so long on matters entirely political at an annual meeting of shareholders, but they are the root cause of present financial uncertainties. My colleagues and I have seen the market value of the investments for which we are responsible decline in about eighteen months by some 40%, or £12m., due to events entirely beyond our control and in such circumstances I have a duty to draw attention to the underlying factors in the situation.

In conclusion I would like to refer with very sincere regret to the death last February of Mr. A. Comar Wilson who had been a London member of the Board of the Corporation for some five years. His charming personality and friendly help at all times will be greatly missed by our colleagues in London and by all of us in Johannesburg who had the privilege of knowing him.

The *Statistical Summary of the Mineral Industry*, for the years 1954-59, is now available from H.M. Stationery Office, Price £1 7s. 3d. (£1 8s. 4d. post). This annual volume of statistical tables, published by the Overseas Geological Survey's Mineral Resources Division, with 396 pages, contains comprehensive details of world production, exports and imports of all important commercial minerals and metals. The trade tables cover not only the crude minerals and metals, but also the chief semi-manufactured products, refinery products and other derivatives.

The Lead Development Association has moved its offices to 34 Berkeley Square, London, W.1. Telephone No. Grosvenor 8422. Telegraphic address: Leadevep, Wesdo, London.

### Alcoa in Major Australian Project

A report received as we go to press states that Alcoa will hold 51 per cent of the shares in a company formed in Australia to establish and operate in Australia an integrated aluminium complex. Three Australian companies—Western Mining Corporation, North Broken Hill and Broken Hill South—will hold the balance of the shares in the concern, which will be known as Alcoa of Australia (Pty.) Ltd. Bauxite for the complex will be mined and refined at Kwinana, Western Australia, and then shipped for smelting at a plant to be built near Geelong, close to Melbourne. The new company will develop brown coal deposits in Victoria for smelting the alumina. The report adds that export markets will be sought and that Alcoa will supply technical knowledge.

## Obituary

### MR. D. D. BELCHAM

The death was announced recently in Cornwall, of Mr. D. D. Belcham, a director and former manager of South Crofty. He was 69. Mr. Belcham was a member of the Institution of Mechanical Engineers, an Associate Member of the Institution of Mining and Metallurgy, and a governor of the Camborne School of Mines and of the Cornwall Technical College. Mr. Belcham was also a director of Stone Products Ltd.

### MR. C. E. TRUSTRAIL

The death has been announced, on June 2, of Mr. C. E. Trustrail at the age of 71. Mr. Trustrail was a director of Stone Products, Ltd. a Cornish company which he had formed. He had been associated with a number of mining and quarrying enterprises in Cornwall, including Carn Brea, Tincroft, Phoenix and, more recently, Hemerdon, of which he was a director before its acquisition by the Ministry of Supply during the last war.

### HONOURS LIST

Among those who have been created Knights Bachelor in the recent Birthday Honours List are the following: Mr. W. K. G. Allen, chairman and managing director of W. H. Allen, Sons and Co.; Dr. J. F. Baker, Professor of Mechanical Sciences, and Head of the Department of Engineering, University of Cambridge; Mr. S. Barratt, chairman, Albright and Wilson; Mr. A. G. Clark, chairman and managing director, Plessey Co.; Mr. H. E. Snow, a deputy chairman and managing director, British Petroleum, and Mr. R. R. Blackwood, general manager, Dunlop Rubber Co. Australia. The C.M.G. has been conferred on Mr. G. R. Fisher, chairman of the board of directors of Mount Isa Mines. Sir Ivan Rice Stedeford has been granted the G.B.E., and Mr. I. J. Pitman the K.B.E. Mr. C. F. Barnard, Executive vice-chairman, Mirrieles, Bickerton and Day, Mr. N. H. Searby, of Ferranti, and Mr. G. A. Whipple, chairman and managing director of Hilger and Watts, have received the C.B.E. Those receiving the O.B.E. include Mr. C. S. Emery, of Sir W. G. Armstrong Whitworth Aircraft and Mr. J. Melville, of Vickers-Armstrongs.



**MINING FINANCE—Continued**

with prospecting for, and opening up, new mines in and near the Canadian Arctic.

Through its subsidiaries and associates Ventures is planning this summer to do further stripping and diamond drilling on the high-grade gold prospect in northern Saskatchewan, and also to conduct a programme of exploration and development on the iron property situated in the Queen Charlotte Islands. It is hoped that sufficient tonnages will be developed to justify working this iron deposit.

The exploration work carried out by Canadian Tungsten on the property near Watson Lake N.W.T. has indicated a deposit of commercial value and Ventures, in conjunction with Amax and Dome Mines, has agreed to finance the company up to production. This, it is estimated, will cost \$5,000,000. Ventures has also agreed to provide a pro-rata share of a further \$1,000,000 should this be required. The mine is expected to come into production by the end of 1962.

During 1961 it is anticipated that the Ventures' dividend income will exceed the 1960 figure by over \$500,000 increasing the income per share from \$1.45 to \$1.65.

**HISTORY OF KANSANSHI**

In his review of the operations of the Rhodesia-Katanga company the chairman, Mr. M. T. W. Easby, has given a brief history of the operations at Kansanshi mine since the deposit was discovered in 1899. (Page 707.)

Originally Rhodesia-Katanga owned the Kansanshi mine but following negotiations with the Anglo American Corporation a new company, the Kansanshi Copper Mining Co., was formed in 1952 and was given the option to purchase the Kansanshi mine following a programme of examination. The new company exercised its option in December, 1954, and thus Rho-Kats interest in the property was reduced to the value of its shareholding in the new company, namely 35.24 per cent.

This is Rho-Kats' most important investment and the fortunes of the company rest to a large degree upon the success of the exploitation of Kansanshi. Before the flooding, in October, 1957, the ore reserves had been estimated to contain 106,000 tons of copper divided into three distinct sections, the sulphide ores, high grade oxides and the low grade oxides. The bulk of the reserve, over 65 per cent, is contained in the low grade oxides. The problem

throughout has been the treatment of these low grade oxides which are associated with the green wall rock. At present an investigation into the possibilities of the old segregation process is being made.

This process is basically one in which the crushed ore is heated with salt and coal in order to reduce the refractory copper values to metal and precipitate the metallic copper on the coal, from which it is readily recovered by a conventional flotation process. This process is already in commercial application elsewhere and it is hoped that it may be the solution to the Kansanshi problems. In the meantime, the property remains on a care and maintenance basis. In the event of the segregation process being economically successful it would be some years before the property could be brought to the dividend paying stage.

Rhodesian-Katanga's quoted investments had a market value at December 31, 1960, of £64,775 compared with a book value of £276,671. The income from these investments was insufficient to cover the gross interest on its 6 per cent unsecured loan stock and thus together with the general expenditure the company's loss over the year was £6,656.

The company, in association with Rio Tinto and Chartered is carrying out an exploration programme in the areas over which it holds mineral rights. These areas cover approximately 2,500 sq. miles.

**London Market Highlights**

Although business in London remained at a very low ebb, the Kafir market was firm enough on Monday and Tuesday thanks to a spasmodic and rather selective Johannesburg support. Generally speaking, the remainder of the June half-yearly dividends from the mines made little impact on sentiment. An exception was the sharply reduced payment of East Rand Proprietary which lowered the shares by 1s. 9d. to 23s. 6d. despite the rather more hopeful comment in the chairman's statement. Otherwise, West Driefontein merely eased to 81s. 3d. following the latest increase in dividend which is part of a line of successive raises on each half-yearly occasion since 1953.

But the firm undertone of the market wilted on Wednesday when Johannesburg received with some disappointment the news that South Africa's gold and foreign exchange reserves had relapsed again after the previous week's improvement which was the first recovery seen in 14 weeks. Price losses in the mines themselves were usually limited to a 1s. or so. Among the leaders, for instance, Western Holdings (118s. 9d.), Free State Geduld (90s.) and St. Helena (58s. 9d.) each reacted 1s. 3d. while Harmony stayed a dull spot with a fresh fall of 9d. to 22s. 6d.

The Finance group became particularly dull following the General Mining chairman's statement. This reiterated many of the points made in the recent Anglo American speech of Mr. Oppenheimer and in particular stressed the fact that the growth of finance concerns and of their dividends is now being checked by the need to conserve cash resources in order to provide the risk capital that can not at present be obtained from the overseas investor. Anglo American lost 1s. 3d. to 128s. 9d., "Johnnies" fell 1s. 6d. to 40s. and

Union Corporation were similarly depressed at 50s.

The tentative recovery in copper shares that was remarked upon here last week continued for a while but became dampened on Wednesday when the Cape buying interest began to wane. Even so, this still left prices above the levels ruling at the end of the previous week. Nchanga showed a net rise of 1s. 6d. at 50s. 6d. after having reached 51s. 3d. and Rhodesian Anglo American at 59s. 9d. were 1s. 3d. up on balance after having been 60s. 3d. Among the land issues, London and Rhodesian continued their steady rise, reaching a new high for the year of 6s. 4d. on hopes of land deals under the new Rhodesian racial set-up. Another notably firm spot was in Tanganyika Concessions which climbed 2s. 6d. to 25s. 9d. following Mr. Hammarhjöld's comment that the Congo crisis was over.

Tins moved narrowly for the most part but the undertone of the market was still very firm. London buyers lifted Ayer Hitam 2s. to the best price this year of 47s. 9d. and Tronoh showed a similar advance at 65s. 3d. Excellent dividend news was reflected in rises of 1s. 3d. to 34s. in Southern Malayan and of 9d. to 17s. in Kepong.

Otherwise, Mountain Copper rallied smartly to 16s. after having previously come back to 13s. 9d. on the lower 1960 profits. Western Mining came to life, Australian buying raising the shares 1s. 9d. to 14s. 9d. Later, it was announced that a £A40,000,000 company had been formed to develop a new Australian aluminium mining, smelting and refining industry using bauxite from the Darling Ranges; the company is to be 51 per cent owned by Aluminium Co. of America with the remainder of it being shared by Western Mining, Broken Hill South and North Broken Hill.

**Anglo-Burma Tin.**—The preliminary results of Anglo-Burma show an increase in profit before taxation of over £2,500. However increased taxation has reduced this increment to £367, the net profit for the year being £3,870. A dividend of 2d. per share, free of tax has been recommended. The results of the joint venture company Anglo-Burma Tin (1956) show a small increase in the tin output to 338 tons but expenditure has risen out of proportion with this production. The net profit for the year has therefore been reduced to £3,339 leaving the debit balance on the profit and loss account at £11,717. Meeting July 12, London.

**A Good Value at President Brand.**—Borehole S.P.8 situated almost in the centre of President Brand's southern lease area has intersected the basal reef at a depth of 6,801 ft. The assay value was 14.5 dwt. gold over 34 in., equivalent to 493 in. dwt. This is a most encouraging result and appears to suggest that the reasonable values of the east and south-east corner may stretch further west than had previously been anticipated.

**Mexicanization for Fresnillo.**—The board of directors of the Mexican lead-zinc producer are recommending to the shareholders that a 51 per cent interest in the Fresnillo company's Mexican operations be sold to a Mexican controlled corporation. This recommendation has been made in order that the company may qualify for the considerable taxation reductions that, under the terms of the recently amended Mexican mining law, are not available to foreign controlled companies. Furthermore, foreign controlled companies cannot obtain new mining concessions.

## MALAYAN CHAMBER OF MINES

### MR. E. D. SHEARN'S ADDRESS

The Forty-Third Annual General Meeting of the Malayan Chamber of Mines was held on June 14 at 65, London Wall, London, E.C. In the course of his speech **Mr. E. D. Shearn**, the chairman, said:—

#### International Tin Agreement

It is with pleasure that, on the occasion of this, my third annual address, I am able to record that the industry has been freed and still is free from the shackles of export control. The International Tin Council decided, at its meeting in August, 1960, not to fix a total permissible export amount for the quarter beginning October 1, 1960, and similar decisions were come to by that Council in December last and again in March of this year. It follows that in the absence of anything unforeseen, we can anticipate freedom from control, anyway, until the end of the month of June. It is my hope that thereafter the statistical position of the industry and economic conditions generally will continue to be such as to encourage the International Tin Council to decide, each time the matter comes before it for decision, not to fix any total permissible export amount.

#### The New International Tin Agreement

After much labour upon the draft of a new Agreement, extending over several months, the International Tin Council at its meeting in June, 1960, in New York recommended to its member governments that at the end of the present Agreement on June 30, 1961, a new Agreement should be entered into in the form considered and approved at the United Nations Tin Conference held in New York during May and June, 1960.

The general principles underlying this new Agreement are fundamentally similar to those of the present Agreement. There are certain major differences decided upon in the light of the working of the present Agreement. Chief among these are:—

1. The new buffer stock will be 20,000 tons (as against 25,000 tons) to be contributed in the proportions of 12,500 tons metal and cash equivalent of the balance or such other proportions as the Council may decide at its first meeting on July 3, 1961.

2. The buffer stock has power to borrow to an extent to be determined by the Council with the safeguard for producing countries that all of them must approve. There is no power to borrow in the present Agreement.

- 3.—Export control cannot be operative unless and until 5,000 tons metal (10,000 tons under the present Agreement) are held or are expected to be held in the buffer stock at the beginning of the next control period if export control is to be introduced after a period of no control or 10,000 tons if a period of control is to continue.

By December 31, 1960, Malaya and all the other six producing countries together with 14 consuming countries had signed the new Agreement. It therefore appears that the new Agreement will become effective.

#### Liquidation of the Existing Buffer Stock

It is with gratification that I am able to record that the Malayan Government has indicated that it has given consideration to the proposal that arrangements should be made so that the Government can repay the miners in Malaya who contributed to the present buffer stock. If that is done the amount required to finance Malaya's contribution to the new buffer stock will be recouped from the industry by way of a compulsory levy on the export of tin spread over an estimated period of about 2½ years; that is on the lines of the procedure adopted in respect of contribution to the present buffer stock. Details of the proposals are awaited.

#### Taxation

The industry has viewed with apprehension the ever increasing burden of taxation with which it is faced.

In the year 1958 Company tax was increased from 30 per cent to 40 per cent.

In 1959 heavy extra duties were imposed on fuel and diesel oils. The 1960 Budget provided that export duty on tin ore was to be increased when the Singapore tin metal price exceeded \$388.50 per picul.

The increase in export duty is in fact a discriminatory tax and in this connexion I would stress two points.

1. The prosperity of the tin, in common with the rubber industry spells prosperity for the whole country and its many other commercial and industrial undertakings but the two industries (tin and rubber) alone bear this increase in taxation.

2. An export duty on a commodity is not of necessity a tax on profits but is paid before profits are made and even if they are not made.

The latter consideration is of considerable importance not only to the industry but also to the Government. If—as time goes on—tin mining in Malaya is not to become a declining industry it will only escape from so doing because miners will find it profitable to work low grade areas. To do this it will require a high capital investment and a fairly high price for tin metal will be necessary so that there will be a reasonable profit margin over high production costs. The increased taxation militates against this high capital investment because it makes it all the less likely that there will be a reasonable margin of profit. The increases in the long run can bring about a shrinkage of, and not an increase in, Government revenue. These considerations should not be overlooked by the advisers to the Malayan Government.

#### Conclusion

As in previous years I take advantage of the opportunity afforded me in making my annual address to express my sincere thanks to the members of the Council for their friendly support and in particular to the vice-chairman, Mr. J. N. Davies, and to our very able secretary, Mr. A. D. Dawson, for whose assistance I am greatly indebted to him. We have had the co-operation of the F.M.S. Chamber of Mines, the Malayan Mining Employers' Association and others to all of whom we owe a debt of gratitude.

**DAVIES INVESTMENTS LTD.,**  
Private Bankers (Gross assets exceed £2,500,000), are paying 7½% p.a. interest on deposits for the eighth year in succession, with extra ½% added annually on each £500 unit. Details and Audited Balance Sheet from Investment Dpt. MN., Davies Investments Ltd., Danes Inn House, 265 Strand, London, W.C.2.

Applications are invited for the post of **PROFESSOR OF MINING ENGINEERING** at the Government College of Engineering and Technology, Lahore, West Pakistan.

#### Contract:

3-5 years.

#### Age Limits:

Between 40 and 45, relaxable in special cases.

#### Qualifications:

- (1) First Class Honours Degree in Mining Engineering from a recognized University. Post-graduate degree in addition preferred.
- (2) 13 years' experience of which at least 5 years should be in teaching and 3 years practical. College administrative experience in responsible capacity an advantage.

Apply stating minimum salary and terms acceptable immediately to:

Education Adviser,  
High Commission for Pakistan.  
London, S.W.1.

Applications are invited for the post of **ASSISTANT PROFESSORS IN MINING ENGINEERING** (2 vacancies) at the Government College of Engineering and Technology, Lahore, West Pakistan.

#### Contract:

5 years.

#### Age Limits:

Between 30 and 40, relaxable in special cases.

#### Qualifications:

- (1) First Class Honours Degree in Mining Engineering from a recognized University — M.Sc. in Mining Engineering from a Western University preferred.
- (2) At least 7 years' experience, of which not less than 3 years should be on the teaching side and not less than 2 years on the practical side.

Apply stating minimum salary and terms acceptable immediately to:

Education Adviser,  
High Commission for Pakistan.  
London, S.W.1.

